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EXPANDED SITE INSPECTION REPORT
CARSTAB CORPORATION (MORTON INTERNATIONAL, INC.) SITE
CINCINNATI, OHIO
EPA ID #OHD 000724138

DRAFT REPORT

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Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Site Assessment Unit
77 West Jackson Boulevard
Chicago, IL 60604

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EPA Work Assignment No.	:	36-5JZZ
EPA Region	:	5
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This draft expanded site inspection report is confidential and pre-decisional in nature. Information contained in this report may not be released without the approval of the U.S. Environmental Protection Agency Region 5 Site Assessment Unit.

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1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC), was tasked by the U.S. Environmental Protection Agency (EPA) to conduct an expanded site inspection (ESI) of the Carstab Corporation (Carstab) site under Contract No. 68-W8-0084, Work Assignment No. 36-5JZZ.

The general purposes of an ESI are (1) to collect information on current site conditions to assess the threat posed to human health and the environment, and (2) determine the need for additional investigation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Specific objectives of the ESI are as follows:

- To collect all data necessary to prepare and document a scoring package under the Hazard Ranking System (HRS).
- To provide data to document any observed releases, levels of contamination, and attribution of hazardous substances.

After the ESI, EPA, in consultation with state authorities, will determine if the Carstab site should be further investigated, or if the site should be designated as having the site evaluation accomplished (SEA). The SEA designation means that, based on information available at the time of the SEA designation, no additional investigations will be conducted. However, if new site information is brought to the EPA's attention, the site may be reevaluated. For sites warranting further information under CERCLA and SARA authority, an HRS scoring package will be prepared after the ESI if the resulting data are sufficient.

The Carstab site was initially discovered in 1979. EPA performed a preliminary assessment (PA) for the site in 1987. The PA score indicated the site as a potential candidate for the National Priorities List (NPL). EPA performed a screening site inspection (SSI) at the site in 1990. An ESI was subsequently recommended for the site.

The ESI was performed by PRC. PRC performed a reconnaissance inspection of the Carstab site on March 10, 1992, prepared an ESI site-specific implementation plan (SSIP) for the site, and submitted the plan to EPA for approval. EPA approved the SSIP on July 21, 1992. Due to access negotiations, field sampling activities were performed in several phases. Municipal drinking water well sampling was conducted on July 22, 1992. Ground-water monitoring wells were installed and developed from September 14 through September 18, 1992. Soil and sediment sampling was performed on September 22, 1992, and ground-water sampling was performed on September 28 and 29, 1992.

2.0 SITE BACKGROUND

This section presents a general site description and history. Information in this section was obtained during SSIP preparation, the site representative interview, and the site inspection.

2.1 SITE DESCRIPTION

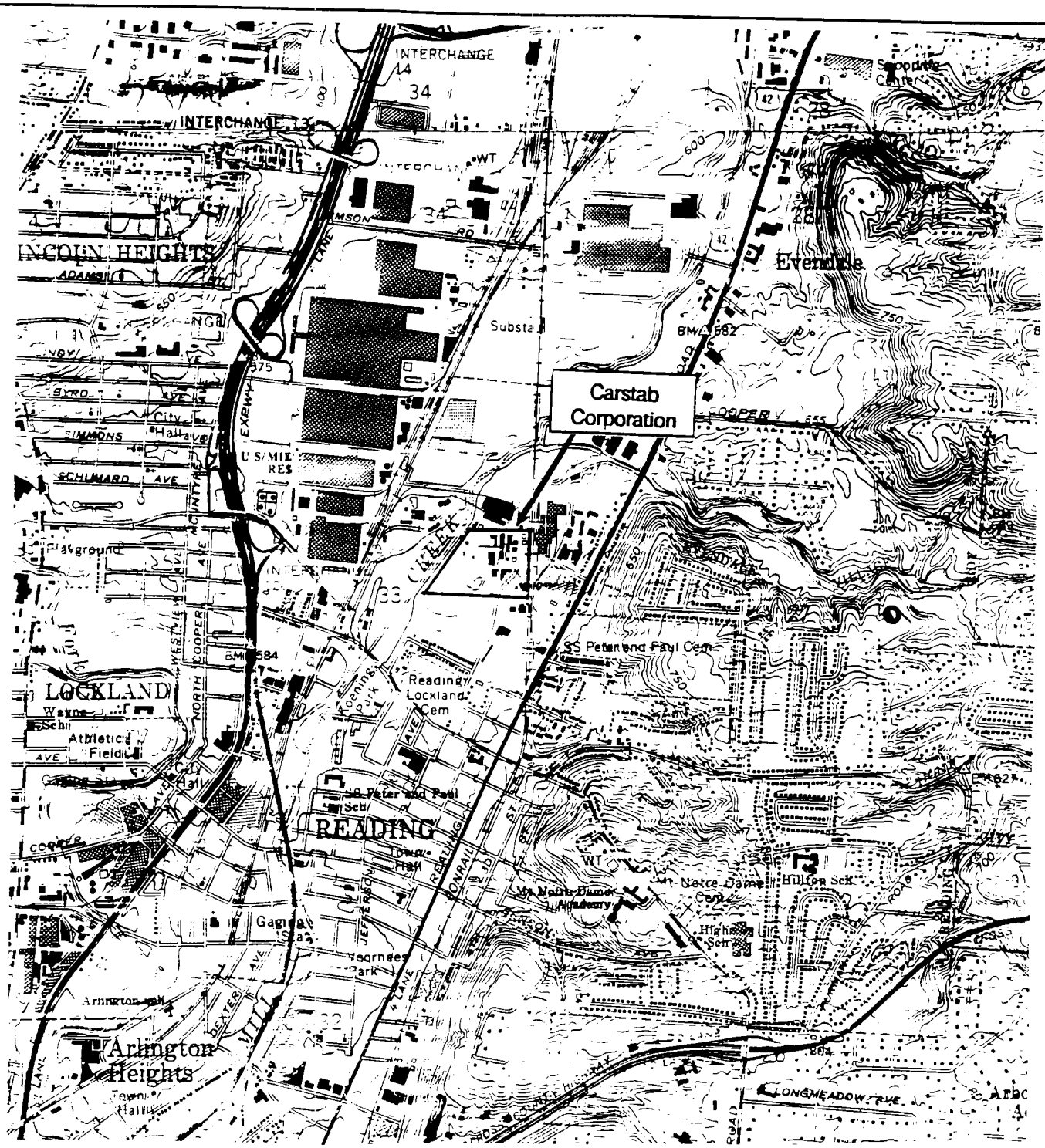
The Carstab site is an active chemical manufacturing facility located at 2000 West Street, within the City of Reading (Reading), Hamilton County, Ohio (Figures 1 and 2). The facility is owned and operated by Morton International, Inc. (Morton). Carstab manufactures heat stabilizers and lubricants for rigid polyvinyl chloride (PVC). The facility also manufactures additives, surfactants, and anti-oxidants for asphalt compounds (Morton, 1992d).

The site covers about 34 acres (Figures 2 and 3). Twenty-seven acres are within a fenced area used for production operations. Several public baseball fields, maintained by Reading, are located outside the southern site fence, on a 7-acre parcel also owned by Morton.

Surrounding land use is mixed industrial, residential, and commercial. The nearest residences are located about 250 yards south of the site. The total population within a 1-mile radius of the site is about 12,000 (EPA, 1991a; United States Department of Commerce, 1991). The nearest school is located about 0.5 mile south of the site. The site is bounded by the east fork of Mill Creek on the west, a city park, public pool, and athletic stadium on the south, and the Conrail railroad on the east. The Pristine, Inc. (Pristine), NPL site, a former hazardous waste incineration/disposal facility, is adjacent to the northeast portion of the Carstab site. Cincinnati Drum, Inc. (Cincinnati Drum), a drum recycling facility, is located north of Carstab and west of Pristine.

Numerous other industrial sites are located in the area. General Electric, Inc. (GE), and an asphalt plant are located west of Carstab, on the opposite (west) side of Mill Creek. Aluchem, Inc., a company that performs process grinding of aluminum silicates (Morton, 1992b), and an inactive grain elevator/transfer facility are located to the east of the Conrail tracks.

The Carstab site is located near the eastern side of the Mill Creek Valley. The western part of the site is relatively flat. A steep topographic rise occurs in the northeast corner of the site. Topographic elevations range from about 550 feet above mean sea level (msl) at the western site boundary to about 578 feet msl in the northeast site corner.



SCALE 1:24000

1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

SCALE: 1" = 2,000'

QUADRANGLE LOCATION

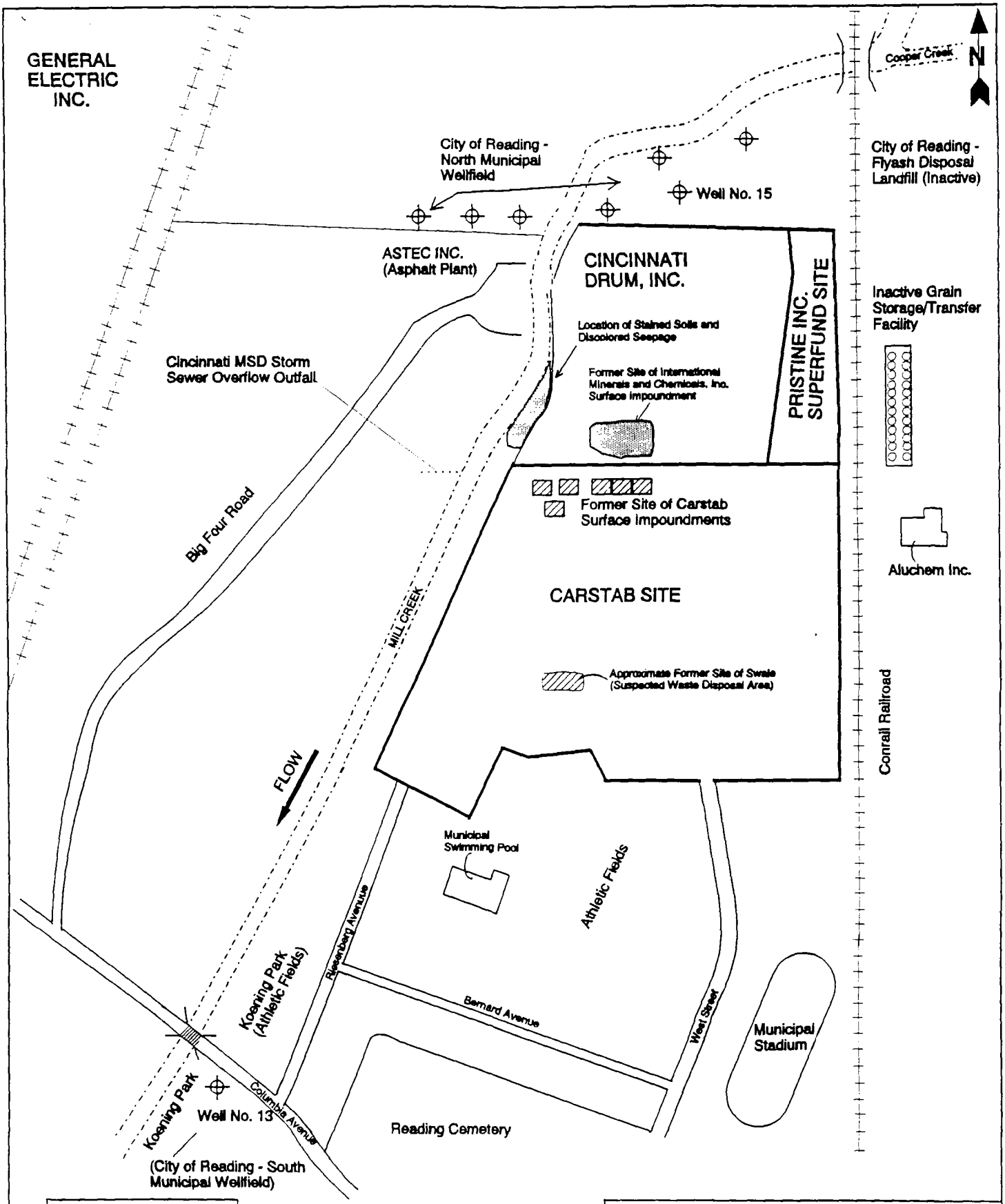
SOURCE: Modified from USGS, 1961a; 1965.

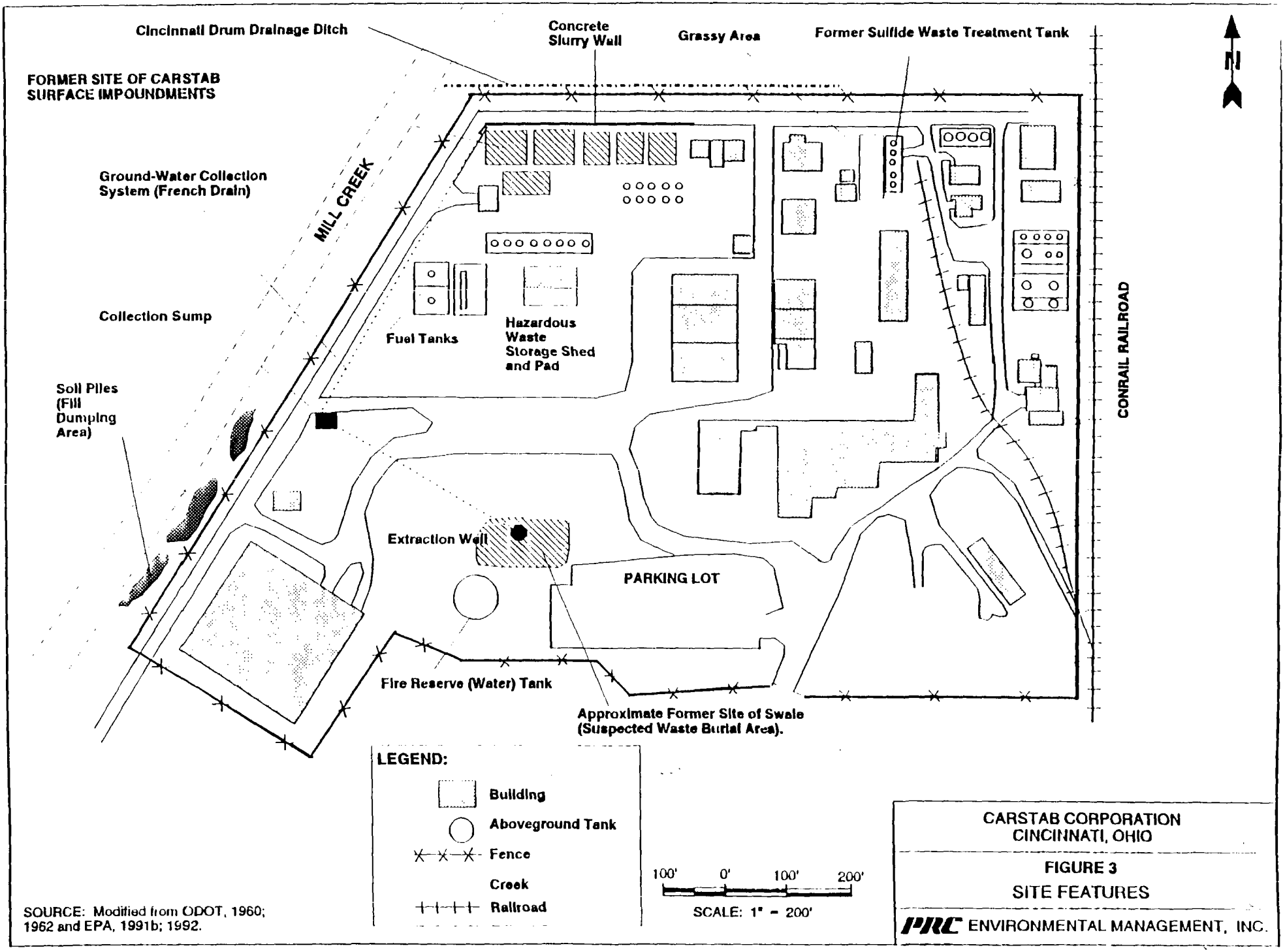
CARSTAB CORPORATION
CINCINNATI, OHIO

FIGURE 1

SITE LOCATION MAP

PRC ENVIRONMENTAL MANAGEMENT, INC.

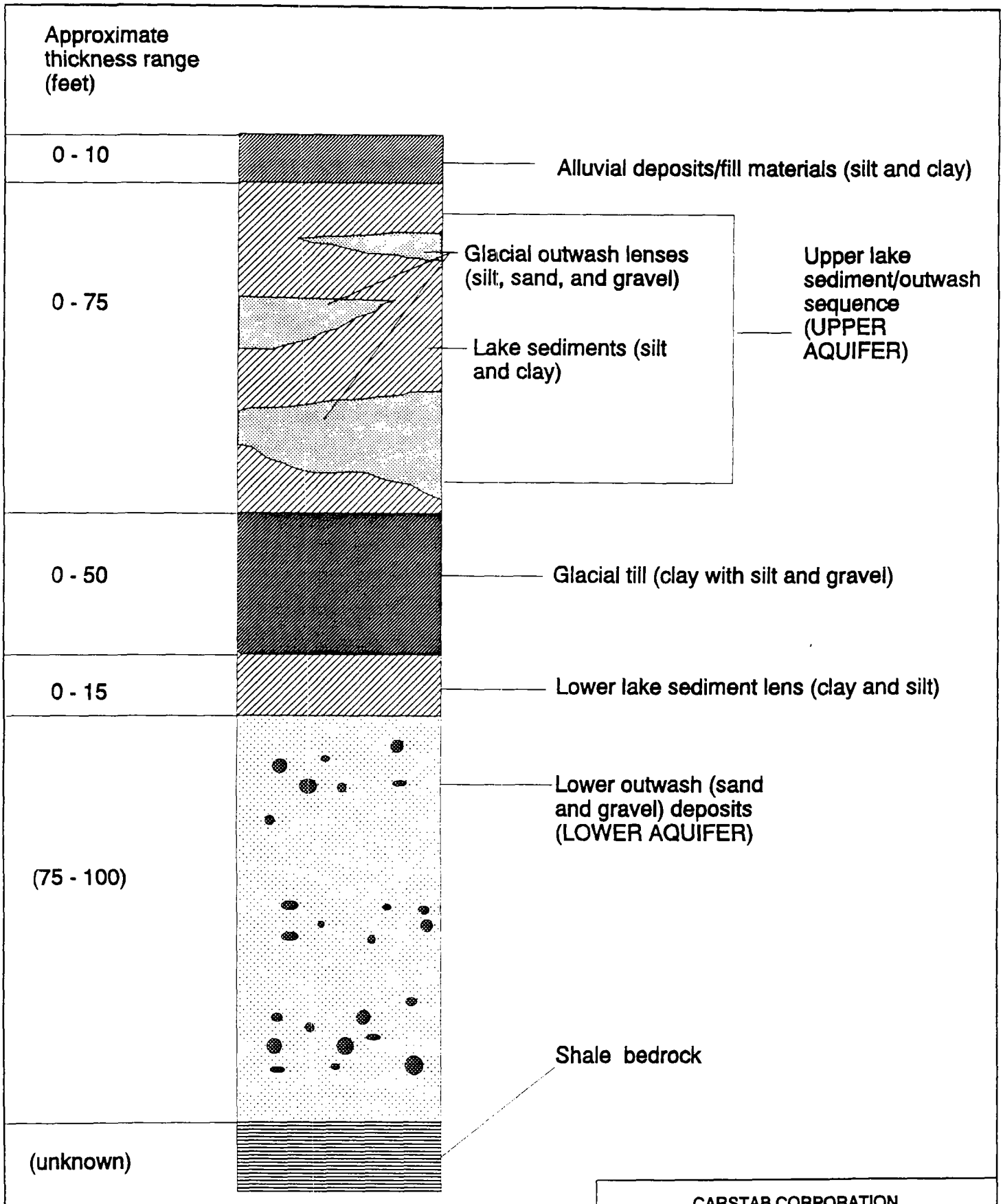




Subsurface materials in the Carstab site vicinity consist of about 150 to 180 feet of unconsolidated valley-fill sediments that overlie shale bedrock (ODNR, 1959). The valley-fill sediments consist of a thin layer of recent (post-glacial) alluvial material overlying glacial deposits. The glacial deposits consist of interbedded outwash (silt, sand, and gravel), till (clays and silts), and lake deposits (also clays and silts) that are discontinuous and often lenticular in form (ODNR, 1959; EPA, 1987). A generalized stratigraphic column for the site vicinity, based on data from the Pristine site, is presented in Figure 4. Due to the complex nature of the glacial deposits, actual conditions at any specific location may vary significantly from those indicated.

In the site vicinity, the outwash deposits form two aquifers, partially separated by a layer of glacial till (ODNR, 1959). The upper aquifer consists predominantly of discontinuous outwash lenses interbedded with lake sediments, as indicated on Figure 4. The upper aquifer is not used for drinking water supplies (ODNR, 1959). The upper aquifer overlies a discontinuous layer of Wisconsinan glacial till (clay, silt and gravel), and at some locations, another layer of lake sediments. The lower aquifer, which consists of relatively thick outwash layers, with occasional discontinuous clay and silt layers, is beneath the till (EPA, 1987). The lower aquifer supplies drinking water to several municipalities in the area (Reading, Wyoming, Lockland, and Glendale) and process water to several industrial facilities (EPA, 1991a). Available information indicates that the upper and lower aquifers are hydraulically connected (EPA, 1987; OEPA, 1992c). Site-specific hydrogeology is discussed in more detail in Section 4.2.1.

The Reading municipal wells are the closest drinking water wells to the Carstab site. Reading's wells are located in two wellfields. The north wellfield is located about 500 feet north of Carstab; the south wellfield is about 1,600 feet south of Carstab, in Koening Park. Past testing of the Reading wells has indicated the presence of volatile organic compounds (VOC), primarily 1,2-dichloroethane (1,2-DCA), at concentrations exceeding the Maximum Contaminant Level (MCL) established by the Safe Drinking Water Act of 1987. In 1987, the Ohio Environmental Protection Agency (OEPA) ordered Reading to close several wells, including their highest capacity well (Well No. 15; see Figure 2) due to this contamination. The Reading wells were placed back into service after Reading installed an air-stripping unit. OEPA issued a 5-year permit to Reading to use the wells and air-stripping unit, with the contingency that Reading would locate a suitable alternate wellfield location or convert to water from an outside supplier (such as the City of Cincinnati). Suspected sources of the contaminants have included the Pristine site and the GE facility (EPA, 1992). However, despite the extensive hydrogeologic testing performed to date, the complex nature of the glacial deposits and numerous potential sources of contamination have prevented complete attribution of the contaminants to specific sources and complete definition of contaminant migration pathways (OEPA, 1992d).



Stratigraphy indicated is primarily based on data collected at the Pristine NPL site. Actual conditions on site at Carstab may vary from those depicted herein.

SOURCE: ODNR, 1959; EPA, 1987; CRA, 1992.

NOT TO SCALE

CARSTAB CORPORATION
CINCINNATI, OHIO

FIGURE 4

GENERALIZED STRATIGRAPHIC COLUMN FOR SITE VICINITY

PRC ENVIRONMENTAL MANAGEMENT, INC.

2.2 SITE HISTORY

The western and southern parts of the Carstab site were originally part of a large dairy farm (Morton, 1992d). A winery and a smokehouse were located in the northeast portion of the site (Morton, 1992b). The site was purchased and developed by the Cincinnati Milling Machine Company (subsequently known as Cincinnati Milacron) in 1949 (Morton, 1992b). Cincinnati Milacron constructed the chemical manufacturing facilities at the site and operated the plant until 1980, when it was purchased by Carstab Corporation (a division of Thiokol, Inc.). Thiokol, Inc., merged with Morton in 1982. The two companies separated in 1989; Morton's Industrial Chemicals Division retained ownership of the Carstab site.

The Pristine and Cincinnati Drum sites were formerly owned by the International Minerals and Chemicals Company (IMC). Prior to being used for hazardous waste disposal, the Pristine site was used for manufacturing sulfuric acid (EPA, 1987). The Cincinnati Drum site formerly contained a fertilizer production plant (EPA, 1992). Historic aerial photographs of the area indicate that a surface impoundment, about 0.75 acre in size, was also located on the property, now owned by Cincinnati Drum, when it was owned and operated by IMC (ODOT, 1960; 1962) (see Figure 2).

2.2.1 Waste Disposal Practices

During the mid-1950s, a series of six 6-foot-deep surface impoundments was excavated in the northwest portion of the Carstab site. The impoundments were used to treat hydrochloric and sulfuric acid wastes that may have also contained low levels of heavy metals and organic compounds such as waste oils (Morton, 1992c; OEPA, 1986). These wastes may have contained chloral-benzene compounds that subsequently degraded to other organic compounds such as 1,2-dichlorobenzene and chlorobenzene (Morton, 1992c). The first two ponds contained crushed dolomite stone to neutralize the acid wastes. Neutralized liquids were then pumped through a series of three settling ponds. The remaining water was discharged to the sixth pond and allowed to evaporate (Morton, 1992b). Ohio Department of Transportation (ODOT) aerial photographs from 1960 and 1962 indicate that the impoundments covered a combined total surface area of approximately 21,200 square feet. The impoundments were backfilled and covered in 1979.

A second waste disposal area may also have been located in the southwest portion of the site, near where the employee parking lot is now located; however, information regarding this area is limited. A topographic depression, or swale, in this area may have been used for disposal of lime sludge in the early 1950s (Morton, 1992c; 1992d). The swale may also have been used as

a dump by previous site owners, when the property was part of a farm. The area was also partially filled with debris from an old farmhouse and barn that were demolished in the 1960s (Morton, 1992b). Although the exact size of the disposal area is unknown, historic aerial photographs do not indicate extensive waste disposal in this area.

Prior to 1983, Carstab used several aboveground tanks, located in the northeast portion of the site, for sulfide waste treatment and storage. Because of this, Carstab filed a Resource Conservation and Recovery Act (RCRA) Part A permit application as a treatment/storage/disposal (TSD) facility in November 1980. The facility was granted interim status, pending completion of its Part B application. In 1983, Carstab withdrew its RCRA Part A permit application, reverting to generator only status (OEPA, 1992b). The tanks are no longer used for hazardous waste treatment or storage (Morton, 1992b). The facility stores all hazardous wastes for less than 90 days in the designated hazardous waste storage area (see Section 3.0).

2.2.2 Previous Investigations

The Carstab facility was first investigated in 1979 after OEPA personnel observed discolored ground water leaching from the east bank of Mill Creek near the boundary between the Carstab and Cincinnati Drum properties. Subsequently, a former employee of Cincinnati Milacron, who was involved in an occupational exposure lawsuit against the company, alleged that wastes had been buried in the former swale in steel and fiber drums (Cincinnati Enquirer, 1980). Subsequent metal detector surveys performed by the EPA Field Investigation Team (FIT) during site reconnaissances in 1980 and 1981 did not indicate extensive burial of steel drums (EPA, 1982). Morton personnel deny any knowledge of drum burial but acknowledge that lime sludge may have been disposed of in the swale in the early 1950s (Morton, 1992c).

In 1982, the FIT performed a site inspection that identified Carstab, Cincinnati Drum, and Pristine as potential sources of pollution in Mill Creek. The investigation indicated that ground-water contamination was occurring on all three sites, and that the former surface impoundments at Carstab were a potential source of the stained ground-water seepage along Mill Creek.

The Pristine site was added to the NPL in December 1982. A remedial investigation (RI) performed at the site from 1984 to 1987 revealed contamination of soil and ground water. Soil and ground-water samples contained elevated concentrations of VOCs, semivolatile organic compounds (SVOC), pesticides, polychlorinated biphenyls (PCB), and metals. Residue from the former Pristine incinerator contained dioxins and furans. One of the most prevalent

contaminants detected in ground water on the Pristine site was 1,2-DCA, which was also detected in Reading's wells (Reading Water Department, 1992d). The RI also concluded that the regional water-supply (lower) aquifer and the upper aquifer were hydraulically connected (EPA, 1987).

Based on the investigations performed from 1979 to 1982, OEPA requested that Carstab perform a hydrogeologic study and install a ground-water remediation system. The hydrogeologic investigations were performed from 1982 to 1983. Activities included the installation of shallow monitoring wells, aquifer pumping tests, and an evaluation of ground-water flow direction (K-V Associates, 1983; Salisbury/ATEC, 1983).

In 1984, Carstab installed a ground-water collection system (french drain) along the western site boundary, to collect contaminated ground water before it could discharge to Mill Creek. A 4-inch-diameter extraction well and submersible pump were installed in the general vicinity of the former swale, to remove contaminated ground water in this area. The collected ground water was treated with hydrogen peroxide and discharged to the Cincinnati Metropolitan Sewer District (MSD) system through a permitted discharge. Because the french drain would create a hydraulic sink (Salisbury/ATEC, 1983), and possibly draw ground water from Cincinnati Drum and Pristine, Carstab installed a concrete slurry wall along the western portion of the northern site boundary (see Figure 3).

In 1990, the FIT performed a site reconnaissance and SSI at Carstab. Ground-water samples were collected from five of the existing monitoring wells. Analytical results indicated the presence of chlorobenzene, at concentrations up to 56 micrograms per liter (μg/L), and several other VOCs at lower concentrations, downgradient from the former surface impoundments. The SVOC 1,2-dichlorobenzene was also detected, as were several tentatively identified organic compounds (TIC), and inorganic analytes including arsenic, manganese, and vanadium. However, the ground-water contamination could not be attributed to Carstab, because suitable background sampling points were not available.

Soil samples, collected from several on-site locations during the SSI, revealed contamination above background levels. The highest concentrations were detected in soil sample S-2, collected at a depth of 7 feet in the former surface impoundment area. This sample contained the VOCs chlorobenzene, toluene, ethylbenzene, and xylene above background levels. The SVOC 1,2-dichlorobenzene was detected at 3,300,000 micrograms per kilogram (μg/kg). Several other SVOCs and TICs were also detected. (Based on an elevation survey performed by PRC during the 1992 ESI, sample S-2 was probably collected at a depth of about 3 to 5 feet above the ground-water table in this portion of the site.) Stained soils were observed where

leachate was seeping from the east bank of Mill Creek, near the Carstab - Cincinnati Drum property line (EPA, 1991a; OEPA, 1992b) . Sample S-3, collected from this area, contained six VOCs (including chlorobenzene) and 11 SVOCs (including 1,2-dichlorobenzene). The similarity between contaminants detected in samples S-2 and S-3 indicated a potential correlation between the former Carstab surface impoundments and the contamination on the banks of Mill Creek. The FIT recommended further sampling of site soils and ground water, to attribute the ground-water contamination to a specific source (EPA, 1991b).

Due to the leachate observed on the bank of Mill Creek, the EPA Technical Assistance Team (TAT) performed a survey of the Carstab site in June 1991. The investigation consisted of sampling soils from several on-site areas and one background location, and evaluating the environmental setting of the site. Although Target Compound List (TCL) compounds and Target Analyte List (TAL) analytes were detected in on-site soil samples, they did not exceed background levels. Soil samples were not collected from the former surface impoundments or the former swale. The TAT report indicated that no immediate removal action was warranted. However, the report recommended that ground-water quality be further investigated due to the potential migration of contaminants to the Reading wells.

2.2.3 Current Issues

Ground-water treatment at the Carstab site was temporarily discontinued, from May to December 1992, due to a citizen's legal suit against the Cincinnati MSD. The suit was settled in court in October 1992, with Morton agreeing to pay a $40,000 fine for violating Clean Water Act standards by releasing unacceptable levels of toluene in its wastewater discharge to MSD (Cincinnati Business Courier, 1992). To reduce the discharge to MSD, the facility has installed a new carbon absorption system and plans to use collected ground water for process purposes (Morton, 1992b).

The Pristine site is currently in the remedial design/remedial action phase (OEPA, 1992a). According to EPA and OEPA personnel, an incinerator will eventually be installed at the site to dispose of the contaminated soil. The approved Remedial Action Plan also calls for ground water remediation. Water will be pumped from the lower aquifer and treated to remove contamination (OEPA, 1992c). Extensive hydrogeologic testing is currently underway at the Pristine site. When complete, the results of this testing could have additional impact on the Carstab investigation (EPA, 1992).

Reading's 5-year permit to use the municipal wells has expired. Because concentrations of 1,2-DCA in the Reading wells have not dropped below MCLs and Reading has not located a suitable alternate wellfield location, OEPA has directed Reading to convert to water from an outside supplier (Reading Water Department, 1992c). Reading has not yet complied with the OEPA directive and is continuing to use the wells. OEPA has filed a legal suit to force Reading to comply. In the November 1992 elections, Reading included a referendum on the ballot giving local citizens the option of choosing whether to comply with OEPA's future decisions regarding use of the wells. Citizens voted to comply. Reading intends to file a legal suit against any parties potentially responsible for the contamination of the wellfields to recoup associated costs if conversion to an alternate source is required (Manley, Burke and Fischer, 1992).

3.0 FIELD OBSERVATIONS, SAMPLING PROCEDURES AND ANALYTICAL RESULTS

This section outlines field observations, sampling procedures, and analytical results from the Carstab ESI. Individual subsections address the site representative interview, walkthrough inspection, and sampling visit, and analytical results. The rationale for specific ESI activities is also provided. The ESI was conducted in accordance with the EPA-approved SSIP, dated July 17, 1992, and the EPA-approved generic quality assurance project plan (QAPjP), dated October 7, 1991. Potential Hazardous Waste Site Inspection Report (Form 2070-13) for the Carstab site is provided in Appendix E.

3.1 RECONNAISSANCE INSPECTION

PRC performed a site reconnaissance of the Carstab facility on March 10, 1992. A representative of the OEPA-Southwest District Office (OEPA-SWDO) accompanied PRC on the reconnaissance. Morton representatives escorted PRC and OEPA-SWDO personnel through the facility. A photographic log of the reconnaissance is presented in Appendix B.

PRC and OEPA-SWDO first met with Mr. John Hanley of Morton, a 30-year employee of the Carstab facility. Mr. Hanley discussed site history and operations, including the operation of the former surface impoundments. He was not aware of disposal activities in the southern portion of the site during his employment at the plant. However, he stated that wastes may have been dumped in the former swale in the 1950s. He had no knowledge of drums having been buried in this area. The group then met with Mr. Bruce Beiser, plant operations manager and a 25-year Carstab employee. Mr. Beiser was also familiar with the operations history and stated that lime sludge may have been disposed of in the swale in the early 1950s. The group then proceeded to another room where a series of low-level oblique aerial photographs taken

throughout the operational life of the facility was on display (Photograph Nos. 1, and 2). The photographs indicated that the former surface impoundments were constructed some time between 1951 and 1959. The swale was not clearly visible in any of the photographs.

PRC and OEPA-SWDO then performed the visual site reconnaissance. PRC and OEPA-SWDO were initially accompanied by Mr. Hanley but were subsequently joined by Mr. Glenn Schaff (Manager, Health, Safety and Environmental), a 22-year employee at the site.

No surface expression of the former swale remains (Photograph No. 3). PRC noted no surficial indication of waste disposal activities in this area. A 4-inch-diameter ground-water extraction well with a dedicated electrical pump, which is part of the ground-water collection system, is located in this area (Photograph No. 4). The exact depth of the well is unknown but is believed to be about 20 feet. The pump was not operating during the reconnaissance. Ground water pumped from the well flows northwestward through a pipe to a collection sump (Photograph No. 5), which also serves as the holding sump for ground-water collected in the french drain.

A total of 15 ground-water monitoring wells were installed at the Carstab site during previous investigations. PRC inspected these wells to evaluate their potential use as ground-water sampling points during the ESI and noted several types of well construction. Many wells did not appear usable due to damage (Photograph No. 6). Most of the wells were unlocked; many of these (including several outside the security fence) were also lacking inner caps. Several wells could not be opened due to damage. In addition, several monitoring wells indicated on 1990 site maps have been removed and have not been replaced (Morton, 1992a). The well abandonment was performed by a drilling subcontractor (Morton, 1992c); however, the abandonment methods used are unknown.

Carstab is using an area between the western fence and Mill Creek for storage of soils excavated during on-site construction activities (Photograph No. 7). The site representatives did not know the exact location from which the soil was excavated (Morton, 1992b; 1992d). According to Morton personnel, the area is probably owned by the City of Reading and is also used for dumping of excavated soils and concrete debris by other parties than Morton. Access to the area is through a gate at the north end of Koening Park, which appears to be kept open at all times (EPA, 1992).

No surficial expression of the former surface impoundments remains (Photograph No. 8). The area is paved with asphalt and concrete. During the 1990 SSI, the FIT observed drums of

hazardous waste being stored on the pavement in this area (EPA, 1991a). PRC observed no wastes in this area during the site reconnaissance. All hazardous wastes generated on site are stored in the designated hazardous waste storage area (Morton, 1992b). The hazardous waste storage area is located in the north-central portion of the site. The area consists of a concrete pad and enclosed metal shed. The concrete pad is surrounded by a drain and sump to prevent migration of spills (Photograph No. 9). Waste is stored outside the shed, in 55-gallon drums, and inside the shed, in drums and plastic-lined cardboard containers (Photograph No. 10). According to plant personnel, all RCRA hazardous wastes are shipped off site within 90 days of generation (Morton, 1992b).

PRC inspected the east bank of Mill Creek in the northwest corner of the site for evidence of the leachate reported in previous years (Photograph No. 11). No seepage was visible on the Carstab property. PRC observed the eastern stream bank from the other side of Mill Creek later that day and noted brown and white stained seepage on Cincinnati Drum's bank about 50 feet north (upstream) of the Carstab property line (Photograph Nos. 12 and 46), about 3 feet above the water level in the creek.

A Cincinnati MSD storm sewer overflow drain outfall discharges to Mill Creek across the stream from the northwest corner of the Carstab site (Photograph No. 13). A drainage ditch, which receives drainage from Pristine and Cincinnati Drum, flows from east to west along Cincinnati Drum's southern boundary (Photograph No. 14) and discharges directly to Mill Creek through a 36-inch-diameter metal culvert. PRC noted red discoloration and an oily sheen on the water in the ditch (Photograph No. 15). Stacks of 55-gallon drums were observed north of the ditch, on the Cincinnati Drum site (Photograph No. 16), approximately where the IMC surface impoundment was located. The entire northern border of the Carstab site is edged by a 6- to-8-inch-high concrete and asphalt berm (Photograph No. 17); on-site surface runoff is directed to storm drains that discharge to the Cincinnati MSD system (Morton, 1992b).

The area immediately south of the former surface impoundments is used for temporary storage of empty 55-gallon feedstock drums (Photograph No. 18). Two aboveground fuel oil storage tanks are also located in this area (Photograph No. 19). The tanks, which were installed in 1974 (Morton, 1992d), are surrounded by an earthen spill containment berm. PRC observed no visible evidence of spills or releases from these tanks.

PRC inspected the portion of the Pristine site adjacent to Carstab. The area was covered with excavation/demolition debris and was devoid of vegetation (Photograph Nos. 20 and 21).

The remaining areas of the Carstab site are used for production, storage of raw materials and shipping of finished products. About 21 buildings and 70 aboveground tanks are located on site (EPA, 1991a). PRC observed no visible evidence of contamination associated with these areas during the reconnaissance, which focused on the primary suspected source areas identified during the 1990 SSI.

Finally, PRC inspected the 7-acre parcel of land south of the employee parking lot, outside the security fence. Several athletic fields (baseball and soccer) are located on this parcel. The fields are maintained by Reading (Morton, 1992b). A municipal swimming pool (Photograph No. 22) is located southwest of the athletic fields.

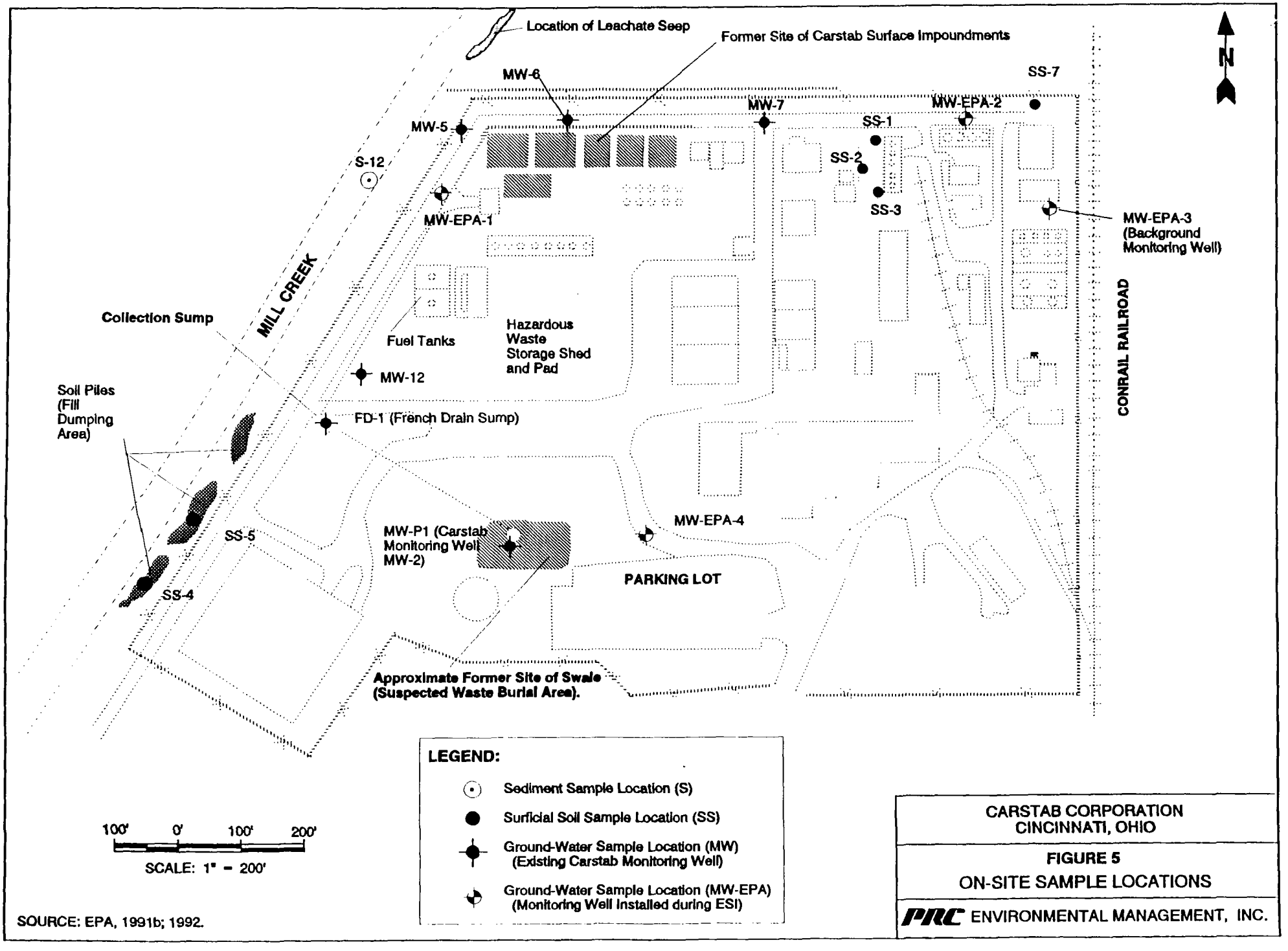
3.2 SAMPLING LOCATIONS AND PROCEDURES

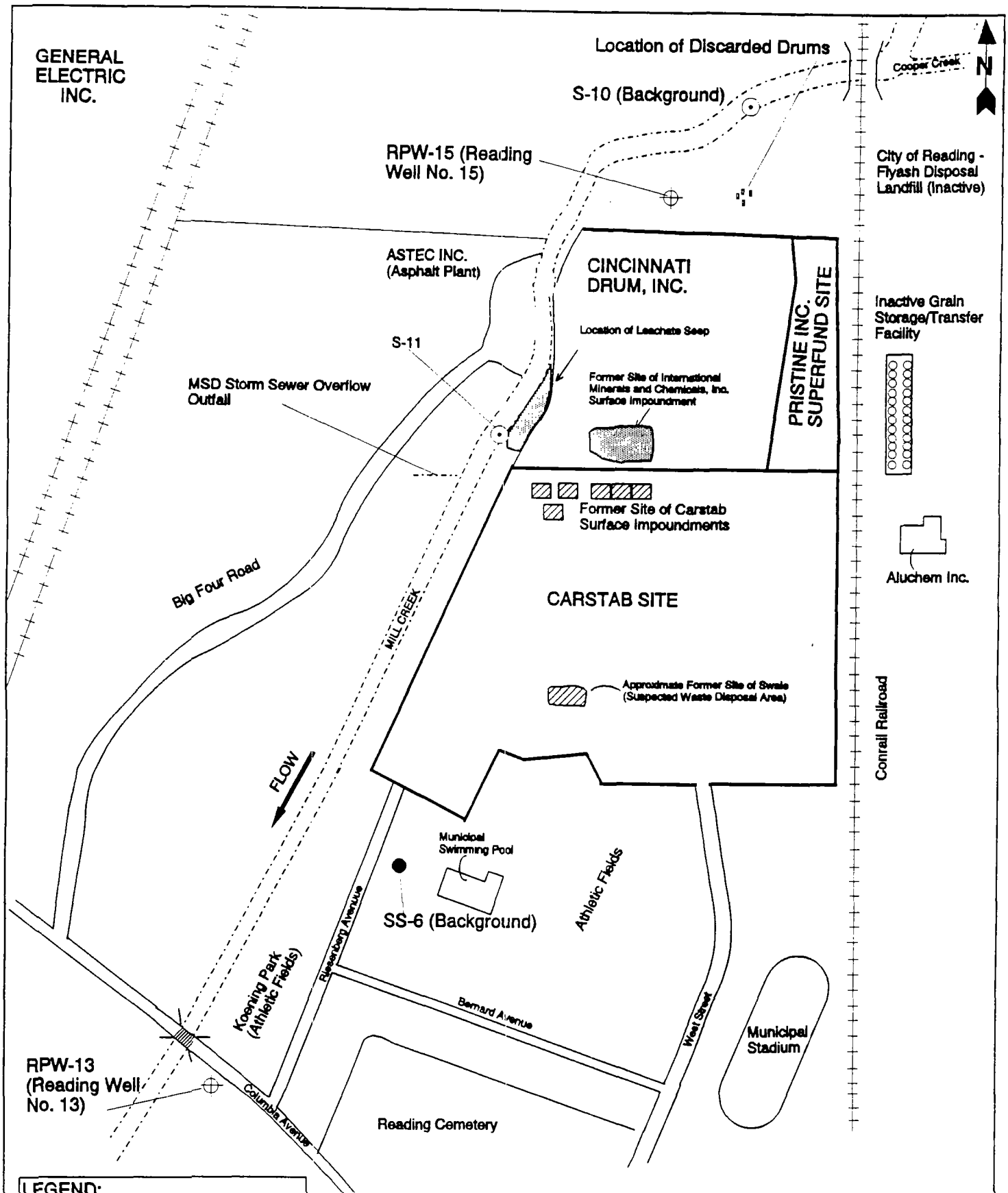
During the ESI PRC collected drinking water (municipal water-supply well), soil, sediment, and ground-water (monitoring well) samples. The sample locations are presented in Figures 5 and 6. Sample locations and collection procedures were in general accordance with the SSIP, dated July 7, 1992 (and subsequent addendum dated September 14, 1992), and the QAPjP, dated October 7, 1991.

3.2.1 Monitoring Well Installation and Ground-Water Sampling

PRC installed and sampled four ground-water monitoring wells during the ESI to determine if suspected source areas at Carstab have released contaminants to ground water. Samples were also collected from five of Carstab's existing wells (installed in 1980 and 1981) and the collection sump for the ground-water collection system.

The four new monitoring wells (MW-EPA-1, MW-EPA-2, MW-EPA-3, and MW-EPA-4) were installed between September 14 and 17, 1992. Borings were advanced using hollow-stem auger drilling methods (Photograph No. 23). During the drilling, PRC inspected split-spoon samples from each boring, to evaluate subsurface conditions. Upon completion, a 2-inch-diameter stainless steel ground-water monitoring well was installed in each borehole, to monitor the uppermost water-bearing zone (Photograph No. 24). Because it was necessary to place the wells in high traffic areas, the wells were completed with flush-mounted, bolt-down protective covers set in a concrete pad (Photograph No. 25). The wells were developed by bailing and surging. The top-of-casing elevation of each well to be sampled was determined to an accuracy of 0.01 feet by leveling. The geologic logs of each boring and well construction details are presented in Appendix A.




GENERAL ELECTRIC INC.
Location of Discarded Drums
Cooper Creek
N
S-10 (Background)
RPW-15 (Reading Well No. 15)
City of Reading - Flyash Disposal Landfill (Inactive)
ASTEC INC. (Asphalt Plant)
CINCINNATI DRUM, INC.
PRISTINE INC. SUPERFUND SITE
Inactive Grain Storage/Transfer Facility
Location of Leachate Seep
S-11
MSD Storm Sewer Overflow Outfall
Former Site of International Minerals and Chemicals, Inc. Surface Impoundment
Former Site of Carstab Surface Impoundments
Aluchem Inc.
Big Four Road
MILL CREEK
CARSTAB SITE
Approximate Former Site of Swale (Suspected Waste Disposal Area)
Conrail Railroad
FLOW
Municipal Swimming Pool
SS-6 (Background)
Athletic Fields
Koenning Park (Athletic Fields)
Riesenberg Avenue
Bernard Avenue
West Street
Municipal Stadium
RPW-13 (Reading Well No. 13)
Columbia Avenue
Reading Cemetery
LEGEND:
Surficial Soil Sample Location (SS)
Sediment Sample Location (S)
Municipal (Drinking Water) Well Sample Location (RPW)
175' 0' 175' 350'
SCALE: 1" = 350'
SOURCE: EPA, 1991b; 1992.
CARSTAB CORPORATION
CINCINNATI, OHIO
FIGURE 6
OFF-SITE SAMPLE LOCATIONS
PRC ENVIRONMENTAL MANAGEMENT, INC.

The monitoring well locations are shown on Figure 5. Well MW-EPA-1 was installed to determine if contaminants are being released from the former Carstab surface impoundments to the upper aquifer. Split-spoon soil samples and auger cuttings from the saturated zone at this location were stained black and exhibited a strong petrochemical odor (Photograph Nos. 26 and 27). Well MW-EPA-3 was installed to evaluate background conditions. Wells MW-EPA-2 and MW-EPA-4 were installed to serve as potential alternate background wells and to provide additional data points for evaluating attribution and ground-water flow direction. The black chemical substance was not observed at these locations. Well location MW-EPA-4 was moved approximately 150 feet west of the location originally specified in the SSIP, because the initial boring did not appear to yield sufficient ground water for sampling (EPA, 1992).

At all locations, drilling was terminated when a layer of dense, gray silty clay was encountered (Photograph No. 28). None of the borings penetrated this layer.

The four new wells (MW-EPA-1, MW-EPA-2, MW-EPA-3, and MW-EPA-4) were sampled on September 28 and 29, 1992 (Photograph Nos. 29, 30, 31, and 32). Several monitoring wells installed during the previous investigations were also sampled. Wells MW-5 (Photograph No. 33) and MW-12 were sampled to further evaluate the potential for releases from the former surface impoundment area. Wells MW-6 and MW-7 (Photograph Nos. 34 and 35) were also sampled, to identify possible contaminants from off-site source areas and thus aid in attribution. A ground-water sample (identified as MW-P1) was collected from well MW-2, to determine if the swale is also a potential source of ground-water contamination (Photograph No. 36). Sample MW-P1 was originally to have been collected from the extraction well in the swale area; however, the pumping apparatus prevented access, and monitoring well MW-2 (which is located about 10 feet away from the extraction well) was sampled instead. The original ESI sample designation (MW-P1) was kept.

Ground-water levels in each well were measured prior to purging. Each well was then purged and sampled using a teflon bailer. All ground-water samples were split with Morton. At wells MW-5 and MW-12 only partial sample volumes were obtainable due to the extremely slow recharge rate and small well diameter. At wells MW-2, MW-6, MW-7, and MW-P1 the small well diameter and slow recharge rate also necessitated use of a peristaltic pump (equipped with silicone tubing) to collect sufficient volume for the metals, pesticide/PCB, and cyanide fractions.

PRC had also planned to collect a ground-water sample from well MW-4; however, the well interior was inaccessible due to a damaged outer casing. To obtain additional information

regarding the quality of site ground water, a sample (designated FD-1) was collected from the holding sump for the ground-water collection system (Photograph No. 37).

3.2.2 Municipal (Drinking Water) Well Samples

PRC collected samples from two of Reading's municipal water supply wells on July 21, 1992. The samples were collected to determine if the wells contained any of the same contaminants present in the upper aquifer at Carstab.

Sample location RPW-13 was Reading Well No. 13, in Koening Park (Photograph No 38). Sample location RPW-15 was Reading Well No. 15, which is located just north of the Cincinnati Drum site (Photograph No. 39). These wells were selected for several reasons: 1) they are near the site; 2) sampling wells to the north and south of the Carstab site would give the greatest possibility of detecting contamination, due to the variable ground-water flow direction (see Section 4.1.2); 3) Well No. 15 is Reading's highest capacity well, proportionally serving the highest population percentage and probably having the largest radius of pumpage influence; and 4) VOCs (suspected to have originated at the Pristine site) have been detected in both wells, indicating susceptibility to contamination. Because the ground-water flow direction in the lower aquifer is highly variable (due to pumpage in the Reading wellfields), and because several other known and suspected sources of contamination are nearby, no suitable background well exists in the site vicinity (OEPA, 1992d).

The municipal well sampling was originally to have been performed concurrently with the on-site sampling. However, access negotiations delayed the on-site sampling. PRC proceeded with sampling the Reading wells due to the difficulty of rescheduling the event to coordinate with periods of pump operation. Because of this, Morton personnel were not present during the municipal well sampling, and none of the Reading well samples were split.

PRC was accompanied by OEPA and Reading Water Department personnel during the sampling. Both wells had been pumping for at least 48 hours prior to sample collection (Reading Water Department, 1992d). At Well No. 13, which uses an electrically-operated submersible pump, the sample was collected through a port on the outflow line that connects the pump to the treatment plant feed line. Well No. 15 was sampled at the wellhead through a sampling tap on the turbine-pump housing (Photograph No. 40).

While sampling Well No. 15, PRC and OEPA observed several small piles of abandoned 55-gallon drums (about 15 drums total) in the north wellfield. The drums, which were about 150

feet northeast of Well No. 15, were badly corroded and partially crushed. One empty drum had a discernible methylene chloride label (Photograph No. 41). Another drum contained a bright, cobalt blue, granular material, but was so badly corroded that no markings were discernible (Photograph No. 42). The other drums appeared to be empty and had no remaining labels or markings. The origin of these drums is unknown.

3.2.3 Sediment Samples

PRC collected three sediment samples from Mill Creek during the investigation. The purpose of the samples was to determine if contamination from the Carstab site was reaching Mill Creek via ground-water discharge. The samples were collected from locations S-10, S-11, and S-12 on September 22, 1992.

The sediment samples were collected from downstream to upstream, to minimize the potential for cross contamination. All sediment samples were split with Morton personnel. Sample location S-12 was adjacent to the Carstab property, generally due west of the location of monitoring well MW-EPA-1 (Photograph No. 43). Sample location S-11 (Photograph No. 44) was about 50 feet north of the Carstab/Cincinnati Drum property line, directly beneath the leachate seep on the east stream bank. The seep was emerging on the stream bank about 3 to 4 feet above the water in the creek and was discharging oily-appearing, white, orange, black, and brown leachate (Photograph No. 45). The leachate extended about 200 feet north (upstream) of sample location S-11, along Cincinnati Drum's western boundary (Photograph No. 46), but was absent south of S-11. It had a strong hydrocarbon odor and was dripping down the bank into the streambed sediments (which were also stained and had a strong hydrocarbon odor).

Sediment sample location S-10 was about 600 feet upstream from the northern boundary of Cincinnati Drum (Photograph No. 47). This sample was collected to evaluate background conditions in Mill Creek.

3.2.4 Soil Sampling Locations

PRC collected seven soil samples on September 22, 1992. Surficial soil samples were collected from locations SS-1, SS-2, and SS-3 in a grassy area in the northeast portion of the site, downslope from a group of aboveground tanks and a railroad siding (Photograph Nos. 48 and 49). These samples were collected to determine the extent of soil contamination detected in this area during the 1990 SSI. A surficial soil sample was also collected from location SS-7, in the

northeast corner of the Carstab site, adjacent to the fence (Photograph No. 50), to evaluate the potential influence of off-site contaminant sources at Pristine.

Soil samples were collected at locations SS-4 and SS-5, in piles of soil that have been dumped outside of Carstab's western site fence (Photograph Nos. 51, 52, and 53). The purpose of these samples was to determine if soils being dumped in the piles were contaminated.

A surficial soil sample was collected off site, at location SS-6, in what appeared to be an undisturbed area across (east of) Riesenberg Avenue from Koening Park (Photograph Nos. 54 and 55). This sample was collected to evaluate background conditions. The sample was moved from the location originally indicated in the SSIP because recent construction activities had disturbed soils in the area.

3.3 ANALYTICAL RESULTS

All samples collected during the ESI were analyzed through the EPA Contract Laboratory Program (CLP). The laboratories analyzed the samples for EPA TCL VOCs, extractable SVOCs, pesticides, and PCBs. The samples were also analyzed for EPA TAL inorganic substances (metals and cyanide), except in several ground-water samples where insufficient sample volume was available for the full suite of parameters. All data were reviewed by EPA Region 5 Central Regional Laboratory (CRL) for compliance with the terms of the CLP, and the data was approved by EPA.

Analytical results for the ground-water, sediment, and soil samples were compared with analytically determined background concentrations to determine which results were significant for HRS scoring purposes. Results indicating substances that were not present in background samples were considered significant, unless the analytical results (for either the sample or background) were qualified due to quality assurance/quality control (QA/QC) results that were outside of acceptable limits. If substances were detected in background samples, a result was considered significant if the sample concentration was at least three times the reported background concentration, except in cases where data was qualified.

In cases where analytical results were qualified because of QA/QC problems, the result for each parameter was evaluated to determine if the QA/QC problem resulted in a high, low, or unknown bias in the data. In accordance with EPA protocols, only those results for which the analytical bias could be determined not to have affected the usability of the result for HRS scoring purposes were considered significant, and in such cases only those substances present at

10 times the background concentration were reported as significant. The significant analytical results are presented in Tables 1, 2, 3, and 4.

The significant results were also evaluated qualitatively, to attribute substances to specific sources. This was necessary due to the potential effects of off-site sources and ground-water flow direction. Only a qualitative evaluation of the municipal well data was possible due to the lack of an appropriate background sample location. All of the substances detected in Reading wells were considered potentially significant.

Matrix interferences resulted in unusable results for the SVOC and pesticide/PCB fractions in several soil and ground-water samples. Because of this, some of the analytical data is qualified as unusable (R) on the summary tables (see Section 3.4), in accordance CRL's narrative provided with the analytical results. However, the unusability of these results did not significantly affect the interpretation of the data set with respect to HRS concerns.

3.3.1 Ground-Water Samples

The results of the ground-water sample analyses were evaluated using the results for the sample from well MW-EPA-3 as background. The potential influence of off-site source areas was also considered, by evaluating contaminant types and concentrations detected in the samples from wells MW-EPA-2, MW-EPA-4, MW-6, MW-7, and the sample from the ground-water collection system (FD-1). The significant results of the ground-water sample analyses are presented in Table 1.

In the sample from well MW-EPA-1, the VOCs acetone, chlorobenzene, benzene, ethylbenzene, toluene, and xylenes; the SVOCs 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene; and the TAL analyte nickel were detected at concentrations significantly above background. Significant concentrations of chlorobenzene were also detected in the sample from well MW-5. Both of these wells are located hydraulically downgradient from the former Carstab surface impoundments, and therefore the former impoundments appear to be releasing contaminants to ground water. The contaminants detected in the samples from wells MW-EPA-1 and MW-5 were not detected at significant concentrations in samples from wells MW-EPA-2, MW-6, or MW-7, which are located upgradient/lateral to the former surface impoundments, and are located between the former impoundments and potential off-site sources (Pristine and Cincinnati Drum). This further indicates that the contaminants are originating in the former surface impoundments.

TABLE 1
SIGNIFICANT FINDINGS OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		MW-EPA-1	MW-EPA-2	MW-EPA-3	MW-EPA-4	MW-EPA-4D	MW-5	MW-6	MW-7	MW-12	MW-P1
Time		1215	1415	1415	1100	1100	1530	1600	1600	1520	1700
Date		9/29/92	9/28/92	9/28/92	9/29/92	9/29/92	9/29/92	9/29/92	9/28/92	9/29/92	9/28/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No		ERM 68	ERM69	ERM74	ERM71	ERM81	ERM75	ERM76	ERM77	ERM78	ERM73
Inorganic Traffic Report No		MESB 68	MESB 69	MESB 74	MESB 71	MESB 81		MESB 76	MESB 77	N/A	MESB 73
Temperature (C)		--	16.9	23.0	22	22	24	27	18 7	26	21
Specific Conductivity (umhos/ca)		5,920	1,456	1,500	2,100	2,100	900	750	2,190	1,500	2,500
pH		7 20	7 33	6 8	7.20	7 20	6 81	6.50	6 94	6 80	6 90
Comments				Background Sample		Field Duplicate	N/A	N/A	N/A	N/A	Carstab Well MW-2
Appearence		Opaque, Gray	Slightly Brown, Turbid	Slightly Gray-Brown, Turbid	Light Gray-Brown	Light Gray-Brown	Clear, Colorless	Opaque Black	Opaque Gray	Light Gray	Dark Gray Opaque
COMPOUND DETECTED											
VOLATILE ORGANIC COMPOUNDS	**CRQL**										
vinyl chloride	10	ND	ND	ND	ND	ND	ND	ND	35	ND	ND
acetone	10	2,700	ND	ND	ND	ND	19	13	ND	ND	22
1,1-dichloroethane	10	ND	ND	ND	ND	ND	ND	ND	87	5 J	ND
1,2-dichloroethene (total)	10	ND	ND	ND	ND	ND	ND	ND	28	ND	ND
benzene	10	48 J	ND	ND	ND	ND	6 J	ND	3 J	1 J	3 J
tetrachloroethene	10	ND	25	ND	ND	ND	ND	ND	ND	ND	ND
toluene	10	630	ND	ND	ND	ND	ND	ND	ND	ND	3 J
chlorobenzene	10	2,300	ND	ND	2 J	ND	730 D	ND	4 J	4 J	150
ethylbenzene	10	110 J	ND	ND	ND	ND	2 J	ND	ND	ND	ND
xylenes (total)	10	360	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS	**CRQL**										
phenol	330	210 J	ND	ND	ND	ND	--	ND	940 DJ	ND	ND
1,3-dichlorobenzene	330	110 J	ND	ND	ND	ND	--	ND	ND	ND	0 7 J
1,4-dichlorobenzene	330	640 J	ND	ND	ND	ND	--	ND	ND	2 J	4 J
1,2-dichlorobenzene	330	4,700 J	ND	ND	ND	ND	--	4 J	ND	9 J	11
2-methylnaphthalene	330	ND R	ND	ND	ND	ND	--	ND	16 J	ND	ND
dibenzofuran	10	ND R	ND	ND	ND	ND	--	ND	31 J	ND	ND
bis(2-ethylhexyl)phthalate	10	ND R	ND	ND	ND	ND	--	ND	190 D	ND	2 J
PESTICIDES/PCBs	**CRQL**										
heptachlor	0 05	3 1 JP	ND	ND	ND	ND	--	ND	ND R	ND R	ND R
gamma chlordane	0 05	3 7 JP	ND	ND	ND	ND	--	ND	ND R	ND R	ND R
TENTATIVELY IDENTIFIED COMPOUNDS	**CRQL**										
None Significant											

TABLE 1 (Continued)
SIGNIFICANT FINDINGS OF GROUND–WATER SAMPLE ANALYSES

Sampling Location		MW–EPA–1	MW–EPA–2	MW–EPA–3	MW–EPA–4	MW–EPA–4D	MW–5	MW–6	MW–7	MW–12	MW–P1
Time		1215	1415	1415	1100	1100	1530	1600	1600	1520	1700
Date		9/29/92	9/28/92	9/28/92	9/29/92	9/29/92	9/29/92	9/29/92	9/28/92	9/29/92	9/28/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM 68	ERM69	ERM74	ERM71	ERM81	ERM75	ERM76	ERM77	ERM78	ERM73
Inorganic Traffic Report No.		MESB 68	MESB 69	MESB 74	MESB 71	MESB 81		MESB 76	MESB 77	N/A	MESB 73
Temperature (C)		--	18.9	23.0	22	22	24	27	18 7	26	21
Specific Conductivity (umhos/ca)		5,920	1,456	1,500	2,100	2,100	900	750	2,190	1,500	2,500
pH		7.20	7.33	6.8	7.20	7.20	6.81	6.50	6.94	6.80	6.90
Comments				Background Sample		Field Duplicate	N/A	N/A	N/A	N/A	Carstab Well MW–2
Appearence		Opaque, Gray	Slightly Brown, Turbid	Slightly Gray–Brown, Turbid	Light Gray–Brown	Light Gray–Brown	Clear, Colorless	Opaque Black	Opaque Gray	Light Gray	Dark Gray Opaque
ANALYTE DETECTED	**CRDL**										
aluminum	200	ND	ND	ND	ND	50.9 BJ	--	2,790	ND	--	ND
nickel	40	57.7 *J	11.9 B	ND	ND	ND	--	ND	ND	--	44 0
vanadium	50	14 6 B	ND	ND	ND	ND	--	4 0 B	ND	--	71.8

Notes:
All organic compound concentrations are in micrograms per kilogram (ug/L) unless otherwise noted
All inorganic analyte concentrations are in milligrams per kilogram (mg/L) unless otherwise noted
CRQL = Contract–required quantitation limit
ND = Not detected
N/A = Not applicable
-- = Not analyzed
CRDL = Contract–required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value.	Value may be semiquantitative, depending on analytical bias
D	Compound identified in an analysis at a secondary dilution factor	Value is quantitative.
P	Used for pesticide and Aroclor compounds when there is a greater than 25 % difference for detected concentrations between two gas chromatograph columns The lower of the values is reported.	Value may be semiquantitative and identity of compound may be questionable (analytical bias unknown).
R	Data is unusable due to major QA/QC problem.	Value is unusable.
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
B	Value is real, but is above instrument detection limit and below CRDL.	Value may be quantitative or semiquantitative
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown).

TABLE 1 (Continued)
SIGNIFICANT FINDINGS OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		FD-1	MW-B1	MW-2B	MW-TB-1	MW-TB-2	MW-TB-3	TB-4
Time		1330	N/A	N/A	N/A	N/A	N/A	N/A
Date		9/29/92	9/28/92	9/29/92	9/28/92	9/28/92	9/29/92	9/29/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM72	ERM79	ERM80	ERM48	ERM49	ERM50	ERM51
Inorganic Traffic Report No		MESB 72	MESB 79	MESB 80	N/A	N/A	N/A	N/A
Temperature (C)		21.8	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity (umhos/ca)		2,900	N/A	N/A	N/A	N/A	N/A	N/A
pH		7.08	N/A	N/A	N/A	N/A	N/A	N/A
Comments		Sump French drain	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Appearence		Light Gray	Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless
COMPOUND DETECTED								
VOLATILE ORGANIC COMPOUNDS	**CRQL**							
vinyl chloride	10	ND	ND	ND	ND	ND	ND	ND
acetone	10	48	ND	4 J	ND	ND	ND	ND
1,1-dichloroethane	10	7 J	ND	ND	ND	ND	ND	ND
1,2-dichloroethene (total)	10	ND	ND	ND	ND	ND	ND	ND
benzene	10	4 J	ND	ND	ND	ND	ND	ND
tetrachloroethene	10	ND	ND	ND	ND	ND	ND	ND
toluene	10	100	ND	ND	ND	ND	ND	ND
chlorobenzene	10	160	ND	ND	2 J	ND	ND	ND
ethylbenzene	10	14	ND	ND	ND	ND	ND	ND
xylenes (total)	10	64	ND	ND	ND	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS	**CRQL**							
phenol	330	7 J	ND	ND	--	--	--	--
1,3-dichlorobenzene	330	16	ND	ND	--	--	--	--
1,4-dichlorobenzene	330	82 DJ	ND	ND	--	--	--	--
1,2-dichlorobenzene	330	590 D	ND	ND	--	--	--	--
2-methylnaphthalene	330	1 J	ND	ND	--	--	--	--
dibenzofuran	10	ND	ND	ND	--	--	--	--
bis(2-ethylhexyl)phthalate	10	ND	ND	ND	--	--	--	--
PESTICIDES/PCBs	**CRQL**							
heptachlor	0.05	ND R	ND	ND	--	--	--	--
gamma chlordane	0.05	ND R	ND	ND	--	--	--	--
TENTATIVELY IDENTIFIED COMPOUNDS	**CRQL**							
None Significant								

TABLE 1 (Continued)
SIGNIFICANT FINDINGS OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		FD-1	MW-B1	MW-2B	MW-TB-1	MW-TB-2	MW-TB-3	TB-4
Time		1330	N/A	N/A	N/A	N/A	N/A	N/A
Date		9/29/92	9/28/92	9/29/92	9/28/92	9/28/92	9/29/92	9/29/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No		ERM72	ERM79	ERM80	ERM48	ERM49	ERM50	ERM51
Inorganic Traffic Report No		MESB 72	MESB 79	MESB 80	N/A	N/A	N/A	N/A
Temperature (C)		21.8	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity (umhos/ca)		2,900	N/A	N/A	N/A	N/A	N/A	N/A
pH		7 08	N/A	N/A	N/A	N/A	N/A	N/A
Comments		Sump French drain	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Appearence		Light Gray	Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless
ANALYTE DETECTED	**CRDL**							
aluminum	200	ND	ND	39.7 B	--	--	--	--
nickel	40	ND	ND	ND	--	--	--	--
vanadium	50	5 8 B	ND	ND	--	--	--	--

Notes:

All organic compound concentrations are in micrograms per kilogram (ug/L) unless otherwise noted

All inorganic analyte concentrations are in milligrams per kilogram (mg/L) unless otherwise noted.

CRQL = Contract-required quantitation limit

ND = Not detected

N/A = Not applicable

-- = Not analyzed

CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value	Value may be semiquantitative, depending on analytical bias
D	Compound identified in an analysis at a secondary dilution factor.	Value is quantitative.
P	Used for pesticide and Aroclor compounds when there is a greater than 25 % difference for detected concentrations between two gas chromatograph columns. The lower of the values is reported	Value may be semiquantitative and identity of compound may be questionable (analytical bias unknown)
R	Data is unusable due to major QA/QC problem.	Value is unusable.
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
B	Value is real, but is above instrument detection limit and below CRDL	Value may be quantitative or semiquantitative.
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown).

TABLE 2
SIGNIFICANT FINDINGS OF MUNICIPAL (DRINKING WATER) WELL SAMPLE ANALYSES

Sampling Location		RPW – 13	RPW – 13 D	RPW – 15	RPW – B – 1
Time		1000	1000	1050	1105
Date		07/21/92	07/21/92	07/21/92	07/21/92
CLP Organic Traffic Report No.		ERM 52	ERM 53	ERM 54	ERM 56
CRL Inorganic Traffic Report No.		MESB 52	MESB 53	MESB 54	MESB 56
Temperature		16	16	17	N/A
Specific Conductivity (umhos/ca)		1075	1075	910	N/A
pH		6 5	N/A	7.3	N/A
Comments		Reading Well No. 13	Duplicate (Reading Well No. 13)	Reading Well No. 15	Field Blank
Appearance		Clear, Colorless	Clear, Colorless	Clear, Colorless	Clear, Colorless
COMPOUND DETECTED					
VOLATILE ORGANIC COMPOUND	CRQL				
methylene chloride	10	ND	0.6 J	0 9 J	ND
1,1 – dichloroethene	10	ND	ND	0 6 J	ND
1,1 – dichloroethane	10	ND	ND	7	ND
trans 1,2 – dichloroethene	10	ND	ND	2	ND
cis 1,2 – dichloroethene	10	4	3	14	ND
chloroform	10	5	4	2	ND
1,2 – dichloroethane	10	360 D	390 D	68 D	ND
trichloroethene	10	4	4	5	ND
SEMIVOLATILE ORGANIC COMPOUND	CRQL				
phenol	330	ND	ND	ND	0.8 J
PESTICIDES/PCBs	CRQL				
None Significant					
TENATIVELY IDENTIFIED COMPOUNDS	CRQL				
Total Volatile Organic Compounds	NA	19 4 J	15 6 J	11.4 J	1.5 J
Total Semivolatile Organic Compounds	NA	56 J	33 J	ND	ND
ANALYTE DETECTED	CRDL				
aluminum	200	324 *J	464 *J	36 5 B*J	157 *J
antimony	60	ND	19.3 B	ND	ND
arsenic	10	26.7	31.2	15.7	ND
barium	200	274	261	182	ND
calcium	5,000	169,000	166,000	133,000	ND
copper	25	272	263	ND	ND
iron	100	9,090	10,200	6,700	ND
lead	3	4 5 J	5.1 J	ND J	ND J
magnesium	5,000	47,300	46,000	37,300	ND
manganese	15	1,240	1,210	572	ND
potassium	5,000	1,640 B	1,560 B	6,630	ND
sodium	5,000	56,500	55,200	54,500	635 B
zinc	20	29.3	27.2	ND	ND

Notes:
- All organic compound concentrations are in micrograms per kilogram (ug/kg) unless otherwise noted
- All inorganic analyte concentrations are in milligrams per kilogram (mg/kg) unless otherwise noted.
- CRQL = Contract-required quantitation limit
- ND = Not detected
- N/A = Not applicable
- CRDL = Contract-required detection limit

* ALL SUBTANCES DETECTED IN THE MUNICIPAL WELL SAMPLES WERE CONSIDERED POTENTIALLY SIGNIFICANT.

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value	Value may be semiquantitative, depending on analytical bias
D	Compound identified in an analysis at a secondary dilution factor	Value is quantitative.
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
B	Value is real, but is above instrument detection limit and below CRDL	Value may be quantitative or semiquantitative (analytical bias unknown)
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown)

TABLE 3
SIGNIFICANT FINDINGS OF SEDIMENT SAMPLE ANALYSES

Sampling Location		S-10	S-11	S-12
Time		1410	1140	1015
Date		09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No.		ERM 57	ERM 58	ERM 59
CRL Inorganic Traffic Report No.		MESB 57	MESB 58	MESB 59
pH		7.9	7.8	7.9
Comments		Background Sample	N/A	N/A
Appearence		Brown	Gray Brown	Brown
		Fine Sand and Silt	Clayey fine sand and silt	Fine sand and silt
COMPOUND DETECTED				
VOLATILE ORGANIC COMPOUND	**CRQL**			
chlorobenzene	10	ND	16	ND
SEMIVOLATILE ORGANIC COMPOUND	**CRQL**			
None Significant				
PESTICIDES/PCBs	**CRQL**			
Aroclor 1254	33.0	ND	60 P	120
TENATIVELY IDENTIFIED COMPOUNDS	**CRQL**			
None Significant				
ANALYTE DETECTED	**CRDL**			
None Significant				

Notes:
- All organic compound concentrations are in micrograms per kilogram (ug/kg) unless otherwise noted.
- All inorganic analyte concentrations are in milligrams per kilogram (mg/kg) unless otherwise noted
- CRQL = Contract-required quantitation limit
- ND = Not detected
- N/A = Not applicable
- CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
P	Used for pesticide and Aroclor compounds when there is a greater than 25% difference for detected concentrations between two gas chromatograph columns. The lower of the two values is reported.	Value may be semiquantitative and identity of compound may be questionable (analytical bias unknown)

TABLE 4
SIGNIFICANT FINDINGS OF SOIL SAMPLE ANALYSES

Sampling Location		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Time		1600	1600	1600	1525	1520	1445	1320
Date		09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No.		ERM 60	ERM 61	ERM 62	ERM 63	ERM 64	ERM 65	ERM 66
CRL Inorganic Traffic Report No.		MESB 60	MESB 61	MESB 62	MESB 63	MESB 64	MESB 65	MESB 66
Depth (below ground surface)		0-6"	0-6"	0-6"	N/A	N/A	0-6"	0-6"
Comments							Background	
Appearence		Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Gray Brown Silty Fill	Gray Brown Silty Fill	Dark Brown Topsoil	Dark Brown Silt with Gravel
COMPOUND DETECTED								
VOLATILE ORGANIC COMPOUNDS	**CRQL**							
None Significant								
SEMIVOLATILE ORGANIC COMPOUNDS	**CRQL**							
phenanthrene	330	77 J	ND	290 J	370 J	ND	1,900	6,300
fluoranthene	330	ND	82 J	330 J	290 J	ND	3,400	23,000 D
benzo(a)anthracene	330	68 J	ND	240 J	150 J	ND	1,900	10,000 D
chrysene	330	170 J	58 J	400 J	430 J	ND	1,900	9,200 D
bis(2-ethylhexyl)phthalate	330	1,200	ND	12,000 BDJ	2,300 BJ	ND	ND	ND
benzo(a)pyrene	330	110 J	ND	230 J	160 J	ND	1,700	7,600
PESTICIDES/PCBs	**CRQL**							
None Significant								
TENATIVELY IDENTIFIED COMPOUNDS	**CRQL**							
None Significant								
ANALYTE DETECTED	**CRDL**							
cadium	1	3.5	3.3	9.6	3.3	3.5	3.3	10.4
chromium	2	101	17.1	47.2	17.7	26.5	16.6	49.0
copper	5	43.7	23.6	93.4 *	16.3	16.5	17.1	153
lead	0.6	422	29.7	117 + J	37.4 +	11.3 +	30.4	526
magnesium	1,000	6,310	10,600	17,000	19,600	3,440	4,830	3,210
mercury	0.1	ND	ND	0.30	ND	ND	ND	0.20
nickel	8	67.3	15.9	26.5	16.6	20.3	16.3	22.5
silver	2	ND	ND	2.6	ND	ND	ND	ND
zinc	4	317	146	436 *	59.6	259	61.0	445

Notes:
All organic compound concentrations are in micrograms per kilogram (ug/kg) unless otherwise noted.
All inorganic analyte concentrations are in milligrams per kilogram (mg/kg) unless otherwise noted
CRQL = Contract-required quantitation limit
ND = Not detected
N/A = Not applicable
CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value.	Value may be semiquantitative, depending on analytical bias.
B	This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns data user to take appropriate action	Value may be semiquantitative and identity of compound may be questionable (analytical bias high)
D	Compound identified in an analysis at a secondary dilution factor	Value is quantitative.
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
J	Value is above CRDL and is an estimated value because of QC protocol.	Value may be semiquantitative, dependent on analytical bias
B	Value is real, but is above instrument detection limit and below CRDL.	Value may be quantitative or semiquantitative (analytical bias unknown)
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown)
+	Correlation coefficient for MSA was < 0.995	Value may be quantitative or semiquantitative (analytical bias unknown)

Acetone, chlorobenzene, 1,2-dichlorobenzene, nickel, and vanadium were detected in the sample from well MW-P1 at concentrations significantly above background. This indicates that the suspected disposal area in the former swale is releasing contaminants to ground water in the upper aquifer. This is further supported by the absence of significant concentrations of these substances in wells MW-EPA-2, MW-7, and MW-EPA-4, which indicates that the contaminants in MW-P1 are originating in the vicinity of the former swale.

Several other contaminants that may be related to on-site operations at Carstab were detected in the ground-water samples. However, insufficient information is available at this time to definitively determine the significance of these contaminants. Most notable among these contaminants was arsenic (see Section 3.4, Table 5), which was detected in the samples from wells MW-EPA-1, MW-P1, and MW-7, at higher concentrations than in background sample MW-EPA-3. Arsenic has been identified as a hazardous waste generated at Carstab (EPA, 1991a), and therefore may be originating at Carstab. The other contaminants were phenol, which was detected at significant concentrations in the samples from wells MW-EPA-1 and MW-7, and the pesticide compounds heptachlor and gamma chlordane, which were detected in the sample from well MW-EPA-1. Poor QA/QC results for the pesticide/PCB fractions resulted in significant analytical biases or unusable data for several ground-water samples, and therefore attribution of the heptachlor and gamma chlordane could not be effectively evaluated.

The samples from wells MW-EPA-2 and MW-7, which were collected to evaluate the potential influence of upgradient sources, did contain significant concentrations of TCL compounds (other than those detected at locations MW-EPA-1, MW-5, and MW-P1). Based on comparison with analytical data from the other wells on the Carstab site and the apparent ground-water flow direction (see Section 4.1), these contaminants appear to be originating at locations hydraulically upgradient from the former Carstab surface impoundments and swale. Therefore, attribution of these contaminants is uncertain based on data collected to date.

3.3.2 Municipal (Drinking Water) Well Samples

Significant findings of drinking water well sample analyses are presented in Table 2. The VOC 1,2-DCA was detected in the samples collected from Reading wells Nos. 13 (sample RPW-13) and 15 (sample RPW-15). The concentrations of 1,2-DCA in both samples exceeded the MCL of 5 µg/kg. Chloroform, trichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, methylene chloride, and the cis- and trans- isomers of 1,2-dichloroethene were also detected. Based on data from the Carstab ground-water samples, and data from the adjacent Pristine site, these VOCs do not appear to be originating at Carstab.

Several TAL analytes were detected in the Reading well samples. Most appear to be natural constituents in local ground water with the exception of arsenic (OEPA, 1992d), which was detected in both of the Reading well samples. Arsenic is listed as a hazardous waste generated on site at Carstab (EPA, 1991a) and was detected in several of the Carstab ground-water samples during the ESI. However, insufficient information is available to determine the significance and attribution of arsenic in ground water at Carstab at this time. Therefore, the potential correlation between arsenic in ground water at Carstab and in the Reading wells is also unknown at this time.

3.3.3 Sediment Samples

The significant findings of the sediment sample analyses are presented in Table 3. The analytical results for the samples from locations S-11 and S-12 were evaluated using the sample from location S-10 for background comparison. As indicated on Table 10 (Section 3.4), concentrations of TCL organic compounds in the background sample were relatively high. This was probably due to the presence of other potential contaminant sources along Mill Creek, upstream from the site vicinity.

Chlorobenzene was detected significantly above background in the sample from location S-11. This suggests that chlorobenzene is being released to Mill Creek from the leachate seep along Cincinnati Drum's western boundary. Because chlorobenzene was detected in ground-water samples from the northwest corner of the Carstab site, the former Carstab surface impoundments may be contributing to the contamination in Mill Creek.

The PCB compound Aroclor 1254 was detected in the samples from locations S-11 and S-12 and was not detected in the background sample S-10. However, ground-water discharge is the only apparent mechanism for transport of contaminants from the Carstab site to the segment of Mill Creek where the samples were collected, and Aroclor 1254 was not detected in on-site ground-water samples at Carstab. Therefore, information is unavailable at this time to attribute a release of Aroclor 1254 to Carstab.

3.3.4 Soil Samples

Significant findings of the soil sample analyses are presented in Table 4. The sample from location SS-6 was used as the background sample for all of the other soil samples. Numerous TCL SVOCs were detected in surficial soil samples from locations SS-1, SS-2, SS-3 and SS-7. However matrix interferences resulted in QA/QC results that were outside of control

limits; therefore the significance of most of the SVOC results could not be determined. However, significant concentrations of the SVOC bis(2-ethylhexyl) phthalate were detected in the sample from location SS-3, and significant concentrations of phenanthrene, fluoranthene, benzo(a)anthracene, and chrysene were detected at concentrations significantly above background in the sample from location SS-7.

The following TAL analytes were detected in the surficial soil samples at concentrations significantly exceeding background: cadmium (SS-7); chromium (SS-1); copper (SS-3 and SS-7); lead (SS-1, SS-3 and SS-7); magnesium (SS-3); mercury (SS-3 and SS-7); nickel (SS-1); silver (SS-3); and zinc (SS-1, SS-3, and SS-7).

Because the results of the sample from location SS-7 indicate that some of the contaminants in surficial soils at Carstab could have originated off site, further evaluation may be necessary to attribute all of the soil contamination to specific sources. However, several of the contaminants (bis(2-ethylhexyl)phthalate, magnesium, nickel, silver, and vanadium) were not detected at significant concentrations in the sample from location SS-7 and therefore appear to be originating at Carstab.

Numerous TCL compounds and TAL analytes were also detected in soil samples from locations SS-4 and SS-5 in the soil piles outside of Carstab's western site fence. However, reported concentrations were not significantly higher than those reported for background sample location S-6, with the exception of magnesium at SS-4. Because the piles apparently contain soils excavated from several areas at the Carstab site, as well as material dumped by parties other than Morton, insufficient information is available at this time to confirm the origin of the contaminants in the piles.

3.4 ANALYTICAL RESULTS SUMMARY TABLES

The following tables present the summarized analytical results for ground-water (Table 5), sediment (Table 6), and soil (Table 7) samples collected for TCL and TAL analyses.

TABLE 5
SUMMARY OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		MW-EPA-1	MW-EPA-2	MW-EPA-3	MW-EPA-4	MW-EPA-4D	MW-5	MW-6	MW-7	MW-12	MW-P1
Time			1415	1415	1100	1100	1530	1600	1600	1520	1700
Date			9/28/92	9/28/92	9/29/92	9/29/92	9/29/92	9/29/92	9/28/92	9/29/92	9/28/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM 68	ERM69	ERM74	ERM71	ERM81	ERM75	ERM76	ERM77	ERM78	ERM73
Inorganic Traffic Report No.		MESB 68	MESB 69	MESB 74	MESB 71	MESB 81		MESB 76	MESB 77	N/A	MESB 73
Temperature (C)		unknown	18.9	23.0	22	22	24	27	18.7	26	21
Specific Conductivity (umhos/ca)		5,920	1,456	1,500	2,100	2,100	900	750	2,190	1,500	2,500
pH		7.20	7.33	6.8	7.20	7.20	6.81	6.50	6.94	6.80	6.90
Comments				Background		Duplicate					Sump-French drain
Appearence		Opaque Light Gray	Slightly Brown, Turbid	Slightly Gray-Brown, Turbid	Light Gray-Brown	Light Gray-Brown	Clear Colorless	Black	Dark Gray	Light Gray	Dark Gray
VOLATILE ORGANIC COMPOUNDS	**CRQL**										
vinyl chloride	10	ND	ND	ND	ND	ND	ND	ND	35	ND	ND
methylene chloride	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acetone	10	2,700	ND	ND	ND	ND	19	13	ND	ND	22
carbon disulfide	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	10	ND	ND	ND	ND	ND	ND	ND	87	5 J	ND
1,2-dichloroethane	10	ND	ND	ND	ND	ND	ND	ND	9 J	ND	ND
1,2-dichloroethene (total)	10	ND	ND	ND	ND	ND	ND	ND	28	ND	ND
chloroform	10	ND	3 J	ND	ND	ND	ND	ND	1 J	ND	ND
trichloroethene	10	ND	ND	ND	ND	ND	ND	2 J	ND	ND	ND
benzene	10	48 J	ND	ND	ND	ND	6 J	ND	3 J	1 J	3 J
4-methyl-2-pentanone	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	6 J
tetrachloroethene	10	ND	25	ND	ND	ND	ND	ND	ND	ND	ND
toluene	10	630	ND	ND	ND	ND	ND	ND	ND	ND	3 J
chlorobenzene	10	2,300	ND	ND	2 J	ND	730 D	ND	4 J	4 J	150
ethylbenzene	10	110 J	ND	ND	ND	ND	2 J	ND	ND	ND	ND
xylenes (total)	10	360	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS	**CRQL**										
phenol	330	210 J	ND	ND	ND	ND	--	ND	94 DJ	ND	ND
bis(2-chloroethyl)ether	330	ND R	ND	ND	ND	ND	--	ND	ND	ND	ND
1,3-dichlorobenzene	330	110 J	ND	ND	ND	ND	--	ND	ND	ND	0.7 J
1,4-dichlorobenzene	330	640 J	ND	ND	ND	ND	--	ND	ND	2 J	4 J
1,2-dichlorobenzene	330	4,700 J	ND	ND	ND	ND	--	4 J	ND	9 J	11
2-methylphenol	330	ND R	ND	ND	ND	ND	--	ND	ND	ND	0.5 J
4-methylphenol	330	ND R	ND	ND	ND	ND	--	ND	ND	ND	5 J
naphthalene	330	ND R	ND	ND	ND	ND	--	ND	23 J	ND	ND
2-methylnaphthalene	330	ND R	ND	ND	ND	ND	--	ND	16 J	ND	ND
dibenzofuran	10	ND R	ND	ND	ND	ND	--	ND	31 J	ND	ND
phenanthrene	10	ND R	ND	ND	ND	ND	--	ND	1 J	ND	ND

TABLE 5 (Continued)
SUMMARY OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		MW-EPA-1	MW-EPA-2	MW-EPA-3	MW-EPA-4	MW-EPA-4D	MW-5	MW-6	MW-7	MW-12	MW-P1
Time			1415	1415	1100	1100	1530	1600	1600	1520	1700
Date			9/28/92	9/28/92	9/29/92	9/29/92	9/29/92	9/29/92	9/28/92	9/29/92	9/28/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM 68	ERM69	ERM74	ERM71	ERM81	ERM75	ERM76	ERM77	ERM78	ERM73
Inorganic Traffic Report No.		MESB 68	MESB 69	MESB 74	MESB 71	MESB 81		MESB 76	MESB 77	N/A	MESB 73
Temperature (C)		unknown	16.9	23.0	22	22	24	27	18.7	26	21
Specific Conductivity (umhos/ca)		5,920	1,456	1,500	2,100	2,100	900	750	2,190	1,500	2,500
pH		7.20	7.33	6.8	7.20	7.20	6.81	6.50	6.94	6.80	6.90
Comments				Background		Duplicate					Sump - French drain
Appearance		Opaque Light Gray	Slightly Brown, Turbid	Slightly Gray-Brown, Turbid	Light Gray-Brown	Light Gray-Brown	Clear Colorless	Black	Dark Gray	Light Gray	Dark Gray
COMPOUND DETECTED (Cont.)	**CRQL**										
di-n-butylphthalate	10	ND R	ND	ND	ND	ND	--	ND	ND	ND	10 J
fluoranthene	10	ND R	ND	ND	ND	ND	--	ND	1 J	ND	ND
pyrene	10	ND R	ND	ND	ND	ND	--	ND	1 J	ND	ND
butylbenzylphthalate	10	ND R	ND	ND	ND	ND	--	ND	ND	ND	ND
chrysene	10	ND R	ND	ND	ND	ND	--	ND	0.8 J	ND	ND
bis(2-ethylhexyl)phthalate	10	ND R	ND	ND	ND	ND	--	ND	190 DJ	ND	2 J
di-n-octylphthalate	10	ND R	ND	ND	ND	ND	--	ND	0.6 J	ND	ND
PESTICIDES/PCBs	**CRQL**										
heptachlor	0.05	3.1 JP	ND	ND	ND	ND	--	ND	ND R	ND R	ND R
gamma chlordane	0.05	3.7 JP	ND	ND	ND	ND	--	ND	ND R	ND R	ND R
TENTATIVELY IDENTIFIED COMPOUNDS	**CRQL**										
Total Volatile Organic	**NA**	1,780 J	18 J	ND	ND	ND	46 J	158 JN	24 JN	ND	53 J
Total Semivolatile Organic	**NA**	25,350 J	13 J	3 J	16 J	7 J	N/A	322 JN	3,314 JN	286 JN	4,494 JN
ANALYTE DETECTED	**CRDL**										
aluminum	200	ND	ND	ND	ND	50.9 BJ	--	2,790	ND	--	ND
antimony	60	ND	ND	43.1 B	25.5 B	ND	--	ND	ND	--	24.7 B
arsenic	10	28.85	ND	4.5 BWJ	2.9 B	2.7 B	--	1.3 BWJ	30.4	--	39.8
barium	200	530 EJ	56.9 B	37.4 B	159 B	177 B	--	5.6 BJ	315	--	67.2 B
calcium	5,000	468,000 EJ	152,000	336,000	196,000	199,000	--	126,000	172,000	--	339,000
chromium	10	9.4 BJ	ND	ND	ND	ND	--	ND	ND	--	ND
copper	25	5.6 B	ND	ND	ND	ND	--	ND	ND	--	ND
iron	100	323 EJ	10.7 BJ	851	1,250	1,290	--	436	13,700	--	25.5 BJ
lead	3	1.9 BWNJ	1.5 BNJ	1.1 BNWJ	ND	1.1 BNW	--	2.5 BNW	1.5 BNW	--	1.5 BNW
magnesium	5,000	174,000 EJ	54,500	121,000	55,400	56,500	--	22,400	41,400	--	73,600
manganese	15	926 EJ	268	568	1,060	1,090	--	674	5,020	--	1,460

TABLE 5 (Continued)
SUMMARY OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		MW-EPA-1	MW-EPA-2	MW-EPA-3	MW-EPA-4	MW-EPA-4D	MW-5	MW-6	MW-7	MW-12	MW-P1
Time			1415	1415	1100	1100	1530	1600	1600	1520	1700
Date			9/28/92	9/28/92	9/29/92	9/29/92	9/29/92	9/29/92	9/28/92	9/29/92	9/28/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM 68	ERM69	ERM74	ERM71	ERM81	ERM75	ERM76	ERM77	ERM78	ERM73
Inorganic Traffic Report No.		MESB 68	MESB 69	MESB 74	MESB 71	MESB 81		MESB 76	MESB 77	N/A	MESB 73
Temperature (C)		unknown	18.9	23 0	22	22	24	27	18.7	26	21
Specific Conductivity (umhos/ca)		5,920	1,456	1,500	2,100	2,100	900	750	2,190	1,500	2,500
pH		7.20	7.33	6 8	7.20	7 20	6 81	6.50	6 94	6 80	6 90
Comments				Background		Duplicate					Sump - French drain
Appearence		Opaque Light Gray	Slightly Brown, Turbid	Slightly Gray-Brown, Turbid	Light Gray-Brown	Light Gray-Brown	Clear Colorless	Black	Dark Gray	Light Gray	Dark Gray
ANALYTE DETECTED (Cont.)	**CRDL**										
nickel	40	57.7 *J	11.9 B	ND	ND	ND	--	ND	ND	--	44 0
potassium	5,000	184,000	2,300 B	1,960 B	2,900 B	2,340 B	--	10,400	3,600 B	--	3,950 B
selenium	5	ND	ND	2 1 BNW	ND	ND	--	ND	1.3 BNW	--	1 2 BNW
sodium	5,000	436,000 EJ	55,200	13,900	263,000	269,000	--	46,000	273,000	--	246,000
vanadium	50	14 6 B	ND	ND	ND	ND	--	4.0 B	ND	--	71.5
zinc	20	19 3 BJ	4.7 BJ	5 6 BJ	11.9 BJ	9.6 BJ	--	7.1 BJ	5.5 BJ	--	4.6 BJ

Notes
- All organic compound concentrations are in micrograms per kilogram (ug/L) unless otherwise noted
- All inorganic analyte concentrations are in milligrams per kilogram (mg/L) unless otherwise noted
- CRQL = Contract-required quantitation limit
- ND = Not detected
- N/A = Not applicable
- -- = Not analyzed
- CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value	Value may be semiquantitative, depending on analytical bias
D	Compound identified in an analysis at a secondary dilution factor.	Value is quantitative.
P	Used for pesticide and Aroclor compounds when there is a greater than 25 % difference for detected concentrations between two gas chromatograph columns The lower of the values is reported	Value may be semiquantitative and identity of compound may be questionable (analytical bias unknown)
R	Data is unusable due to major QA/QC problem.	Value is unusable.
N	This flag applies to tentatively identified compounds whose identity is based on a mass spectral librayr search	Value may be semiquantitative and identity of compound may be questionable
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
J	Value is above CRDL and is an estimated value because of QC protocol	Value may be semiquantitative.
B	Value is real, but is above instrument detection limit and below CRDL	Value may be quantitative or semiquantitative.
E	Value is estimated due to matrix interferences.	Value may be semiquantitative dependent on analytical bias
N	Spike recoveries are outside QC protocols, indicating a possible problem Data may be biased high or low.	Value may be quantitative or semiquantitative (analytical bias may be high or low)
W	Post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is <50% of	Value may be biased high or low
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown)

TABLE 5 (Continued)
SUMMARY OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		FD-1	MW-B1	MW-2B	MW-TB-1	MW-TB-2	MW-TB-3	TB-4
Time		1330	(Field Blank)	(Field Blank)	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Date		9/29/92	9/28/92	9/29/92	9/28/92	9/28/92	9/29/92	9/29/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM72	ERM79	ERM80	ERM48	ERM49	ERM50	ERM51
Inorganic Traffic Report No.		MESB 72	MESB 79	MESB 80	N/A	N/A	N/A	N/A
Temperature (C)		21.8	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity (umhos/ca)		2,900	N/A	N/A	N/A	N/A	N/A	N/A
pH		7.08	N/A	N/A	N/A	N/A	N/A	N/A
Comments								
Appearance		Light Gray	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
VOLATILE ORGANIC COMPOUNDS	**CRQL**							
vinyl chloride	10	ND	ND	ND	ND	ND	ND	ND
methylene chloride	10	ND	ND	61 B	ND	ND	63 B	ND
acetone	10	48	ND	4 J	ND	ND	ND	ND
carbon disulfide	10	4 J	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	10	7 J	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethene (total)	10	ND	ND	ND	ND	ND	ND	ND
chloroform	10	ND	ND	ND	ND	ND	ND	ND
trichloroethene	10	ND	1 J	ND	ND	ND	ND	ND
benzene	10	4 J	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone	10	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene	10	ND	ND	ND	ND	ND	ND	ND
toluene	10	100	ND	ND	ND	ND	ND	ND
chlorobenzene	10	160	ND	ND	2 J	ND	ND	ND
ethylbenzene	10	14	ND	ND	ND	ND	ND	ND
xylenes (total)	10	64	ND	ND	ND	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS	**CRQL**							
phenol	330	7 J	ND	ND	--	--	--	--
bis(2-chloroethyl)ether	330	37	ND	ND	--	--	--	--
1,3-dichlorobenzene	330	16	ND	ND	--	--	--	--
1,4-dichlorobenzene	330	82 DJ	ND	ND	--	--	--	--
1,2-dichlorobenzene	330	590 D	ND	ND	--	--	--	--
2-methylphenol	330	ND	ND	ND	--	--	--	--
4-methylphenol	330	3 J	ND	ND	--	--	--	--
naphthalene	330	ND	ND	ND	--	--	--	--
2-methylnaphthalene	330	1 J	ND	ND	--	--	--	--
dibenzofuran	10	ND	ND	ND	--	--	--	--
phenanthrene	10	0.6 J	ND	ND	--	--	--	--

TABLE 5 (Continued)
SUMMARY OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		FD-1	MW-B1	MW-2B	MW-TB-1	MW-TB-2	MW-TB-3	TB-4
Time		1330	(Field Blank)	(Field Blank)	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Date		9/29/92	9/28/92	9/29/92	9/28/92	9/28/92	9/29/92	9/29/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM72	ERM79	ERM80	ERM48	ERM49	ERM50	ERM51
Inorganic Traffic Report No		MESB 72	MESB 79	MESB 80	N/A	N/A	N/A	N/A
Temperature (C)		21.8	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity (umhos/ca)		2,900	N/A	N/A	N/A	N/A	N/A	N/A
pH		7.08	N/A	N/A	N/A	N/A	N/A	N/A
Comments								
Appearence		Light Gray	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
COMPOUND DETECTED (Cont.)	**CRQL**							
di-n-butylphthalate	10	ND	ND	ND	--	--	--	--
fluoranthene	10	ND	ND	ND	--	--	--	--
pyrene	10	ND	ND	ND	--	--	--	--
butylbenzylphthalate	10	2 J	ND	ND	--	--	--	--
chrysene	10	ND	ND	ND	--	--	--	--
bis(2-ethylhexyl)phthalate	10	ND	ND	ND	--	--	--	--
di-n-octylphthalate	10	ND	ND	ND	--	--	--	--
PESTICIDES/PCBs	**CRQL**							
heptachlor	0.05	ND R	ND	ND	--	--	--	--
gamma chlordane	0.05	ND R	ND	ND	--	--	--	--
TENTATIVELY IDENTIFIED COMPOUNDS	**CRQL**							
Total Volatile Organic	**NA**	6 J	ND	ND	ND	6 J	6 J	ND
Total Semivolatile Organic	**NA**	2,169 JN	9 J	ND	--	--	--	ND
ANALYTE DETECTED	**CRDL**							
aluminum	200	ND	ND	39.7 B	--	--	--	--
antimony	60	ND	ND	ND	--	--	--	--
arsenic	10	24.6	ND	ND	--	--	--	--
barium	200	103 B	1.6 B	3.6 B	--	--	--	--
calcium	5,000	329,000	185 B	139 B	--	--	--	--
chromium	10	ND	ND	ND	--	--	--	--
copper	25	ND	4.7 B	ND	--	--	--	--
iron	100	320	10.1 B	9.7 B	--	--	--	--
lead	3	1.1 BNW	ND	ND	--	--	--	--
magnesium	5,000	53,600	ND	ND	--	--	--	--
manganese	15	843	ND	ND	--	--	--	--

TABLE 5 (Continued)
SUMMARY OF GROUND-WATER SAMPLE ANALYSES

Sampling Location		FD-1	MW-B1	MW-2B	MW-TB-1	MW-TB-2	MW-TB-3	TB-4
Time		1330	(Field Blank)	(Field Blank)	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Date		9/29/92	9/28/92	9/29/92	9/28/92	9/28/92	9/29/92	9/29/92
Depth (feet below ground surface)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Organic Traffic Report No.		ERM72	ERM79	ERM80	ERM48	ERM49	ERM50	ERM51
Inorganic Traffic Report No.		MESB 72	MESB 79	MESB 80	N/A	N/A	N/A	N/A
Temperature (C)		21.6	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity (umhos/ca)		2,900	N/A	N/A	N/A	N/A	N/A	N/A
pH		7.08	N/A	N/A	N/A	N/A	N/A	N/A
Comments								
Appearence		Light Gray	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
ANALYTE DETECTED (Cont.)	**CRDL**							
nickel	40	ND	ND	ND	--	--	--	--
potassium	5,000	4,330 B	ND	ND	--	--	--	--
selenium	5	ND	ND	ND	--	--	--	--
sodium	5,000	119,000	429 B	669 B	--	--	--	--
vanadium	50	5.8 B	ND	ND	--	--	--	--
zinc	20	9.5 BJ	5.6 BJ	4.0 BJ	--	--	--	--

Notes
- All organic compound concentrations are in micrograms per kilogram (ug/L) unless otherwise noted
- All inorganic analyte concentrations are in milligrams per kilogram (mg/L) unless otherwise noted.
- CRQL = Contract-required quantitation limit
- ND = Not detected
- N/A = Not applicable
- -- = Not analyzed
- CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value	Value may be semiquantitative, depending on analytical bias.
D	Compound identified in an analysis at a secondary dilution factor	Value is quantitative.
P	Used for pesticide and Aroclor compounds when there is a greater than 25 % difference for detected concentrations between two gas chromatograph columns The lower of the values is reported	Value may be semiquantitative and identity of compound may be questionable (analytical bias unknown)
R	Data is unusable due to major QA/QC problem.	Value is unusable.
N	This flag applies to tentatively identified compounds whose identity is based on a mass spectral librayr search	Value may be semiquantitative and identity of compound may be questionable.
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
J	Value is above CRDL and is an estimated value because of QC protocol	Value may be semiquantitative
B	Value is real, but is above instrument detection limit and below CRDL.	Value may be quantitative or semiquantitative
E	Value is estimated due to matrix interferences.	Value may be semiquantitative dependent on analytical bias
N	Spike recoveries are outside QC protocols, indicating a possible problem Data may be biased high or low	Value may be quantitative or semiquantitative (analytical bias may be high or low)
W	Post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is < 50% of	Value may be biased high or low
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown)

TABLE 6
SUMMARY OF SEDIMENT SAMPLE ANALYSES

Sampling Location		S-10	S-11	S-12
Time		1410	1140	1015
Date		09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No		ERM 57	ERM 58	ERM 59
CRL Inorganic Traffic Report No		MESB 57	MESB 58	MESB 59
pH		7.9	7.8	7.9
Comments		Background		
Appearence		Brown	Gray Brown	Brown
COMPOUND DETECTED				
VOLATILE ORGANIC COMPOUND	**CRQL**			
1,1-dichloroethane	10	ND	2 J	ND
chlorobenzene	10	ND	16	ND
ethylbenzene	10	ND	2 J	ND
SEMIVOLATILE ORGANIC COMPOUND	**CRQL**			
1,2-dichlorobenzene	330	ND	56 J	42 J
acenaphthylene	330	57 J	ND	ND
acenaphthene	330	73 J	ND	32 J
dibenzofuran	330	57 J	ND	24 J
fluorene	330	130 J	ND	45 J
phenanthrene	330	1,100	300 J	540
anthracene	330	220 J	34 J	71 J
carbozole		160 J	42 J	63 J
di-n-butylphthalate	330	74 J	34 J	ND
fluoranthene	330	2,100	650	970
pyrene	330	1,800	480	850
benzo(a)anthracene	330	1,100	200 J	360 J
chrysene	330	1,100	270 J	410
bis(2-ethylhexyl)phthalate	330	75 J	93 J	210 J
benzo(b)fluoranthene	330	960	270 J	430
benzo(k)fluoranthene	330	870	180 J	310 J
benzo(a)pyrene	330	960	190 J	320 J
indeno(1,2,3-cd)pyrene	330	660	170 J	260 J
dibenzo(a,h)anthracene	330	340 J	70 J	99 J
benzo(g,h,i)perylene	330	820	160 J	280 J
PESTICIDES/PCBs	**CRQL**			
gamma BHC (Lindane)	1.7	ND	0.76 JP	ND
heptachlor	1.7	0.39 JP	1.4 JP	0.71 JP
aldrin	1.7	0.81 J	ND	ND
dieldrin	3.3	0.72 JP	ND	ND
methoxychlor (Marlate)		2.1 JP	ND	ND
endrin ketone	3.3	0.89 JP	1.2 JP	1.2 J
alpha chlordane	1.7	2.6	ND	ND
gamma chlordane	1.7	3.5 P	ND	ND
Aroclor 1254	33.0	ND	60 P	120
TENATIVELY IDENTIFIED COMPOUNDS	**CRQL**			
Total Semivolatile Organic Compounds	NA	7,270 JN	7,800 JN	9,182 JN

TABLE 6 (Continued)
SUMMARY OF SEDIMENT SAMPLE ANALYSES

Sampling Location		S-10	S-11	S-12
Time		1410	1140	1015
Date		09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No.		ERM 57	ERM 58	ERM 59
CRL Inorganic Traffic Report No.		MESB 57	MESB 58	MESB 59
pH		7.9	7.8	7.9
Comments		Background		
Appearence		Brown	Gray Brown	Brown
ANALYTE DETECTED	**CRDL**			
aluminum	40	4,950	7,860	4,600
antimony	12	ND	7.3 BJ	ND
arsenic	2	6.5 +	4.5 S	3.4 S
barium	40	37.8 B	45.4	33.5 B
beryllium	1	0.35 B	0.51 B	0.24 B
calcium	1,000	65,300	83,800	47,900
chromium	2	10.4	15.8	11.7
cobalt	10	5.3 B	8.9 B	4.5 B
copper	5	11.7	20.4	12.8
iron	20	11,400	16,600	8,770
lead	0.6	44.0 S*J	16.7 S*J	54.0 S*J
magnesium	1,000	11,200	16,000	9,840
manganese	3	542 NJ	483 NJ	352 NJ
nickel	8	10.6 B	17.4	8.7 B
potassium	1,000	958 B	1,320	741 B
sodium	1,000	143 B	234 B	119 B
thallium	2	0.34 BWJ	0.26 BWJ	0.26 BWJ
vanadium	10	12.7 B	17.6	10.4 B
zinc	4	45.2	76.7	51.6

Notes:
All organic compound concentrations are in micrograms per kilogram (ug/kg) unless otherwise noted.
All inorganic analyte concentrations are in milligrams per kilogram (mg/kg) unless otherwise noted
CRQL = Contract-required quantitation limit
ND = Not detected
N/A = Not applicable
CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value.	Value may be semiquantitative, depending on analytical bias.
N	This flag applies to tentatively identified compounds whose identity is based on a mass spectral library search.	Value may be semiquantitative and identity of compound may be questionable.
P	Used for pesticide and Aroclor compounds when there is a greater than 25% difference for detected concentrations between two gas chromatograph columns The lower of the two values is reported.	Value may be semiquantitative.
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
B	Value is real, but is above instrument detection limit and below CRDL	Value may be quantitative or semiquantitative
S	Analysis by Method of Standard Additions.	Value is quantitative
*	Duplicate RPD is outside of control limits	Value may be semiquantitative (analytical bias unknown)
+	Correlation coefficient for MSA was < 0.995	Value may be quantitative or semiquantitative (analytical bias unknown)
N	Spike recoveries are outside QC protocols, indicating a possible problem Data may be biased high or low	Value may be quantitative or semiquantitative (analytical bias may be high or low)
W	Post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is < 50% of spike absorbance	Value may be quantitative or semiquantitative (analytical bias may be high or low)

TABLE 7
SUMMARY OF SOIL SAMPLE ANALYSES

Sampling Location		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Time		1600	1600	1600	1525	1520	1445	1320
Date		09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No.		ERM 60	ERM 61	ERM 62	ERM 63	ERM 64	ERM 65	ERM 66
CRL Inorganic Traffic Report No.		MESB 60	MESB 61	MESB 62	MESB 63	MESB 64	MESB 65	MESB 66
Depth (below ground surface)		0-6"	0-6"	0-6"	N/A	N/A	0-6"	0-6"
Comments							Background	
Appearence		Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Gray Brown Silty Fill	Gray Brown Silty Fill	Dark Brown Topsoil	Dark Brown Silt with Gravel
SEMIVOLATILE ORGANIC COMPOUNDS	**CRQL**							
phenol	10	ND	ND	250 J	ND	ND	ND	ND
4-methylphenol	10	ND	ND	76 J	ND	ND	ND	ND
naphthalene	10	ND	ND	ND	ND	ND	ND	74 J
2-methylnaphthalene	10	ND	ND	ND	64 J	ND	ND	88 J
acenaphthylene	330	ND	ND	ND	ND	ND	85 J	ND
acenaphthene	330	ND	ND	ND	ND	ND	84 J	370 J
dibenzofuran	330	ND	ND	ND	ND	ND	68 J	150 J
diethylphthalate	330	ND	ND	64 J	ND	ND	ND	ND
fluorene	330	ND	ND	ND	77 J	ND	130 J	440 J
phenanthrene	330	77 J	ND	290 J	370 J	ND	1,900	6,300
anthracene	330	ND	ND	ND	ND	ND	400 J	1,500
carbazole	330	ND	ND	110 J	76 J	ND	220 J	650
di-n-butylphthalate	330	ND	ND	93 J	ND	ND	ND	82 J
fluoranthene	330	ND	82 J	330 J	290 J	ND	3,400	23,000 D
pyrene	330	140 J	66 J	400 J	450 J	ND	2,800 J	15,000 D
butylbenzylphthalate	330	ND	ND	390 J	ND	ND	ND	ND
benzo(a)anthracene	330	68 J	ND	240 J	150 J	ND	1,900	10,000 D
chrysene	330	170 J	58 J	400 J	430 J	ND	1,900	9,200 D
bis(2-ethylhexyl)phthalate	330	1,200	ND	12,000 BDJ	2,300 BJ	ND	ND	ND
di-n-octylphthalate	330	ND	ND	2,400	ND	ND	ND	ND
benzo(b)fluoranthene	330	230 JXR	120 JXR	670 XR	460 JXR	ND	4,000 XR	19,000 DXR
benzo(k)fluoranthene	330	230 JXR	120 JXR	670 XR	460 JXR	ND	4,000 XR	19,000 DXR
benzo(a)pyrene	330	110 J	ND	230 J	180 J	ND	1,700	7,600
indeno(1,2,3-cd)pyrene	330	ND	ND	180 J	ND	ND	1,400	3,600
dibenzo(a,h)anthracene	330	ND	ND	ND	ND	ND	330 J	900
benzo(g,h,i)perylene	330	ND	ND	140 J	ND	ND	1,400	3,300
PESTICIDES/PCBs	**CRQL**							
beta BHC	1.7	ND	ND	ND	ND	0.54 JP	ND	ND
delta BHC	1.7	ND	ND	ND	ND	0.21 JP	ND	ND
gamma BHC (Lindane)	1.7	0.15 JP	ND	ND	0.21 JP	0.44 JP	0.086 JP	1.7 JP
heptachlor	1.7	ND	0.24 JP	ND	0.63 JP	0.27 JP	0.099 JP	ND
aldrin	1.7	0.29 JP	0.29 JP	0.53 JP	0.91 JP	ND	1.6 JP	ND
heptachlor epoxide	1.7	5.4 P	ND	ND	ND	ND	0.59 JP	ND

TABLE 7 (Continued)
SUMMARY OF SOIL SAMPLE ANALYSES

Sampling Location		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Time		1600	1600	1600	1525	1520	1445	1320
Date		09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No.		ERM 60	ERM 61	ERM 62	ERM 63	ERM 64	ERM 65	ERM 66
CRL Inorganic Traffic Report No.		MESB 60	MESB 61	MESB 62	MESB 63	MESB 64	MESB 65	MESB 66
Depth (below ground surface)		0-6"	0-6"	0-6"	N/A	N/A	0-6"	0-6"
Comments							Background	
Appearance		Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Gray Brown Silty Fill	Gray Brown Silty Fill	Dark Brown Topsoil	Dark Brown Silt with Gravel
COMPOUND DETECTED (Cont.)								
dieldrin	3.3	ND	3.5 JP	ND	ND	ND	0.60 JP	ND
4,4'-DDE	3.3	1.9 JP	ND	ND	0.93 JP	1.4 JP	10 PJ	ND
endrin	3.3	ND	ND	ND	ND	ND	8.7 PJ	31 P
endosulfan II	3.3	ND	ND	ND	ND	ND	3.0 JP	ND
4,4'-DDD	3.3	ND	ND	ND	1.4 J	0.24 JP	ND J	7.0 JP
endosulfan sulfate	3.3	6.5 PJ	1.5 JP	ND	ND	0.23 JP	6.8 PJ	31 PJ
methoxychlor (Marlate)	17.0	10.0 JP	1.6 JP	28 PJ	1.7JP	ND	170 J	ND
endrin ketone	3.3	9.9 J	ND	2.9 JP	1.2 JP	0.46 JP	9.8 PJ	1.1 JP
endrin aldehyde	3.3	1.8 JP	1.0 JP	7.1 PJ	ND	0.39 JP	0.67 JP	120 PJ
alpha chlordane	1.7	5.1 PJ	1.6 JP	6.5 PJ	2.0 JP	0.24 JP	1.6 JP	20 PJ
gamma chlordane	1.7	7.9 PJ	0.26 JP	2.2 JP	0.44 JP	1.3 JP	1.5 JP	1.55 PJ
Aroclor 1254	33.0	220 P *J	140 * J	560 * J	110 P *	14 J	ND	1,000 PC *J
TENATIVELY IDENTIFIED COMPOUNDS	**CRQL**							
Total Semivolatile Organic TICs	NA	70,360 J	11,326 J	216,800 J	99,400 J	5,050 J	22,340 J	114,100 J
ANALYTE DETECTED	**CRDL**							
aluminum	40	11,100	13,300	10,800	11,800	16,500	10,500	7,830
antimony	12	8.5 BNJ	ND	ND	ND	ND	ND	ND
arsenic	2	4.4 NSJ	6.3 NJ	5.1 NJ	11.0 N+J	9.9 N+J	3.8 NSJ	55.0 NJ
barium	40	63.7	97.1	110	89.2	111	82.6	171
beryllium	1	0.76 B	1.4	1.5	1.6	0.92 B	0.89 B	0.68 B
cadium	1	3.5	3.3	9.6	3.3	3.5	3.3	10.4 *
calcium	1,000	14,200 * J	28,600 * J	42,400 * J	65,100 * J	5,300 * J	17,500 * J	8,340 * J
chromium	2	101	17.1	47.2	17.7	26.5	18.6	49.0
cobalt	10	8.5 B	7.2 B	9.2 B	7.3 B	8.1 B	7.0 B	8.2 B
copper	5	43.7	23.8	93.4 *	18.3	16.5	17.1	153 *
iron	20	15,100	16,000	23,600	15,600	19,800	14,300	31,600
lead	0.6	422 *	29.7	117 + J	37.4 +	11.3 +	30.4	526
magnesium	1,000	6,310	10,600	17,000 *	19,800	3,440	4,830	3,210
manganese	3	178	585	581	530	512	728	502
mercury	0.1	ND	ND	0.30	ND	ND	ND	0.20 *
nickel	8	67.3 *	15.9	26.5	16.8	20.3	16.3	22.5
potassium	1,000	1,240 B	1,900	1,670	1,620	2,330	2,010	973 B
selenium	1	ND	ND	ND J	ND J	ND	ND	0.66 B
silver	2	ND	ND	2.8	ND	ND	ND	ND

TABLE 7 (Continued)
SUMMARY OF SOIL SAMPLE ANALYSES

Sampling Location		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Time		1600	1600	1600	1525	1520	1445	1320
Date		09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92	09/23/92
CLP Organic Traffic Report No.		ERM 60	ERM 61	ERM 62	ERM 63	ERM 64	ERM 65	ERM 66
CRL Inorganic Traffic Report No.		MESB 60	MESB 61	MESB 62	MESB 63	MESB 64	MESB 65	MESB 66
Depth (below ground surface)		0-6"	0-6"	0-6"	N/A	N/A	0-6"	0-6"
Comments							Background	
Appearence		Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Dark Brown Silty Topsoil	Gray Brown Silty Fill	Gray Brown Silty Fill	Dark Brown Topsoil	Dark Brown Silt with Gravel
ANALYTE DETECTED (Cont.)								
sodium	1,000	119 B	159 B	220 B	624	106 B	67.1 B	72.7 B
thallium	2	0.82 B	0.63 B	0.63 B	0.61 B	0.59 B	0.45 B	0.78 B
vanadium	10	22.8	26.6	26.7	27.5	29.3	22.2	23.9
zinc	4	317 *	146	438 *	59.8	259 *	81.0	445 *

Notes:
All organic compound concentrations are in micrograms per kilogram (ug/kg) unless otherwise noted.
All inorganic analyte concentrations are in milligrams per kilogram (mg/kg) unless otherwise noted.
CRQL = Contract-required quantitation limit
ND = Not detected
N/A = Not applicable
CRDL = Contract-required detection limit

COMPOUND QUALIFIERS	DEFINITION	INTERPRETATION
J	Indicates an estimated value.	Value may be semiquantitative, depending on analytical bias.
B	This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns data user to take appropriate action.	Value may be semiquantitative and identity of compound may be questionable. (analytical bias high)
D	Compound identified in an analysis at a secondary dilution factor.	Value is quantitative
X	This flag denotes indistinguishable coeluting isomers.	
R	Data is unusable due to major QA/QC problem.	Value is unusable.
P	Used for pesticide and Arocior compounds when there is a greater than 25% difference for detected concentrations between two gas chromatograph columns. The lower of the two values is reported.	Value may be semiquantitative and identity of compound may be questionable. (analytical bias unknown)
ANALYTE QUALIFIERS	**DEFINITION**	**INTERPRETATION**
J	Value is above CRDL and is an estimated value because of QC protocol.	Value may be semiquantitative, dependent on analytical bias.
B	Value is real, but is above instrument detection limit and below CRDL.	Value may be quantitative or semiquantitative. (analytical bias unknown)
S	Analysis by Method of Standard Additions.	Value is quantitative
*	Duplicate analysis was not within control limits.	Value may be semiquantitative. (analytical bias unknown)
+	Correlation coefficient for MSA was < 0.995.	Value may be quantitative or semiquantitative. (analytical bias unknown)
N	Spike recoveries are outside QC protocols, indicating a possible problem.	Value may be semiquantitative. (analytical bias may be high or low)

4.0 PATHWAYS

This section presents information pertaining to identified sources, migration pathways, and target receptors. The four migration pathways of concern are ground water, surface water, soil exposure, and air. Ground-water appears to be the most significantly affected pathway.

The results of subsurface soil analyses performed during the 1990 SSI and ground-water analyses performed during the 1992 ESI indicate that the former Carstab surface impoundments are sources that contain chlorobenzene, 1,2-dichlorobenzene, toluene and several other organic compounds. Verbal information provided by Morton personnel, and other available information, indicates that these compounds are (or were) used on site, or are related to degradation of chemicals used on-site in the past (EPA, 1991a; Morton, 1992c; Cincinnati Business Courier, 1992). The results of the ground-water analyses also indicate that nickel, and possibly arsenic, are being released from this source area. The total area covered by the former surface impoundments, which are now backfilled and covered, was about 21,000 square feet (ODOT, 1960; 1962).

The results of the ground-water analyses also indicate that a second source area is present in the vicinity of the former swale and that this source area is also releasing contaminants to ground water. The nature of contamination in this source area is similar to contamination in the former impoundments. The exact size of this suspected source area is unknown; however, historic aerial photographs do not indicate that it was extensive (ODOT, 1960; 1962).

The results of the surficial soil analyses indicate that contaminated soils, not associated with the former impoundments or swale source areas, are present in the northeast portion of the Carstab site. This area is discussed in more detail in Section 4.3.

Only vague information is available regarding the origin of the soil piles outside of the western site fence. Also, most of the substances detected in the samples from this area were not significantly above background concentrations in nearby surficial soils. Therefore, information available at this time does not indicate that the piles contain significant concentrations of hazardous substances that can be definitively attributed to Carstab.

4.1 GROUND-WATER PATHWAY

The results of the ground-water analyses indicate that the sources at the Carstab site have released chlorobenzene, 1,2-dichlorobenzene, toluene, and other contaminants to the upper aquifer. Data from the Pristine RI indicates that the upper and lower aquifers are hydraulically connected (EPA, 1987; OEPA, 1992d). Because the aquifers are hydraulically connected, the release of contaminants from sources at Carstab to the upper aquifer is also considered a release to the regional water supply (lower) aquifer.

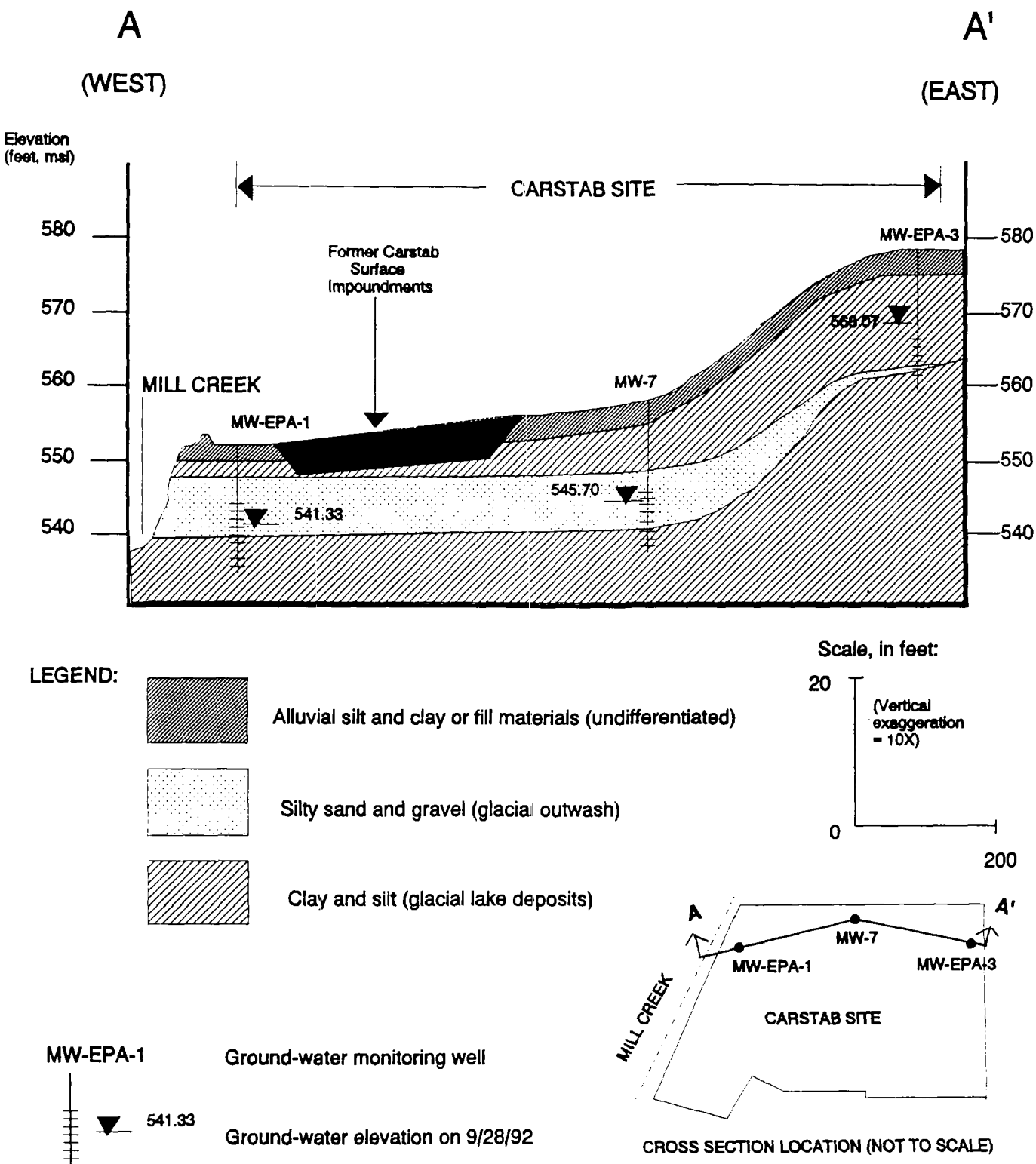
4.1.1 Site Hydrogeology

Subsurface conditions encountered during the Carstab ESI were generally consistent with data from previous investigations. All borings were limited to the upper aquifer. A geologic cross-section, based on the borings, is presented in Figure 7, and the logs of the borings performed during the ESI are presented in Appendix A.

Subsurface materials generally consisted of fill or alluvial silt and clay overlying glacial lake deposits and outwash. The uppermost water-bearing zone was encountered in interbedded silt and fine sand in the northeast part of the site. This zone graded to a relatively thick layer of silty fine to coarse sand and gravel in the western and southern portions of the site. This zone discharges along the east bank of Mill Creek. Dense, unsaturated, gray, silty clay was encountered beneath the water-bearing zone at all boring locations. No borings completely penetrated this clay layer; therefore, its exact thickness is unknown. The top of the clay layer generally slopes to the west and south, and site surface topography appears to closely reflect the configuration of the clay layer. According to a structure-contour map prepared following an extensive on-site boring program in 1982, the clay layer also dips toward the north (toward Cincinnati Drum), in the extreme northwest corner of the site (Salisbury/ATEC, 1982).

Because the borings were limited to the upper aquifer, the depth to the lower aquifer on site was not determined during the investigation. However, data from the adjacent Pristine site indicates that the top of the lower aquifer is at an elevation of about 490-505 feet msl (CRA, 1992). This is about 50 to 70 feet below ground surface at the Carstab site (EPA, 1992).

The apparent ground-water flow direction in the upper aquifer on September 28, 1992 is presented in Figure 8. As indicated, the flow direction was west-southwest, generally towards Mill Creek, following the slope of the underlying clay layer. The ground-water elevation in well MW-6 appeared to be anomalously high in comparison with data from nearby wells MW-5 and



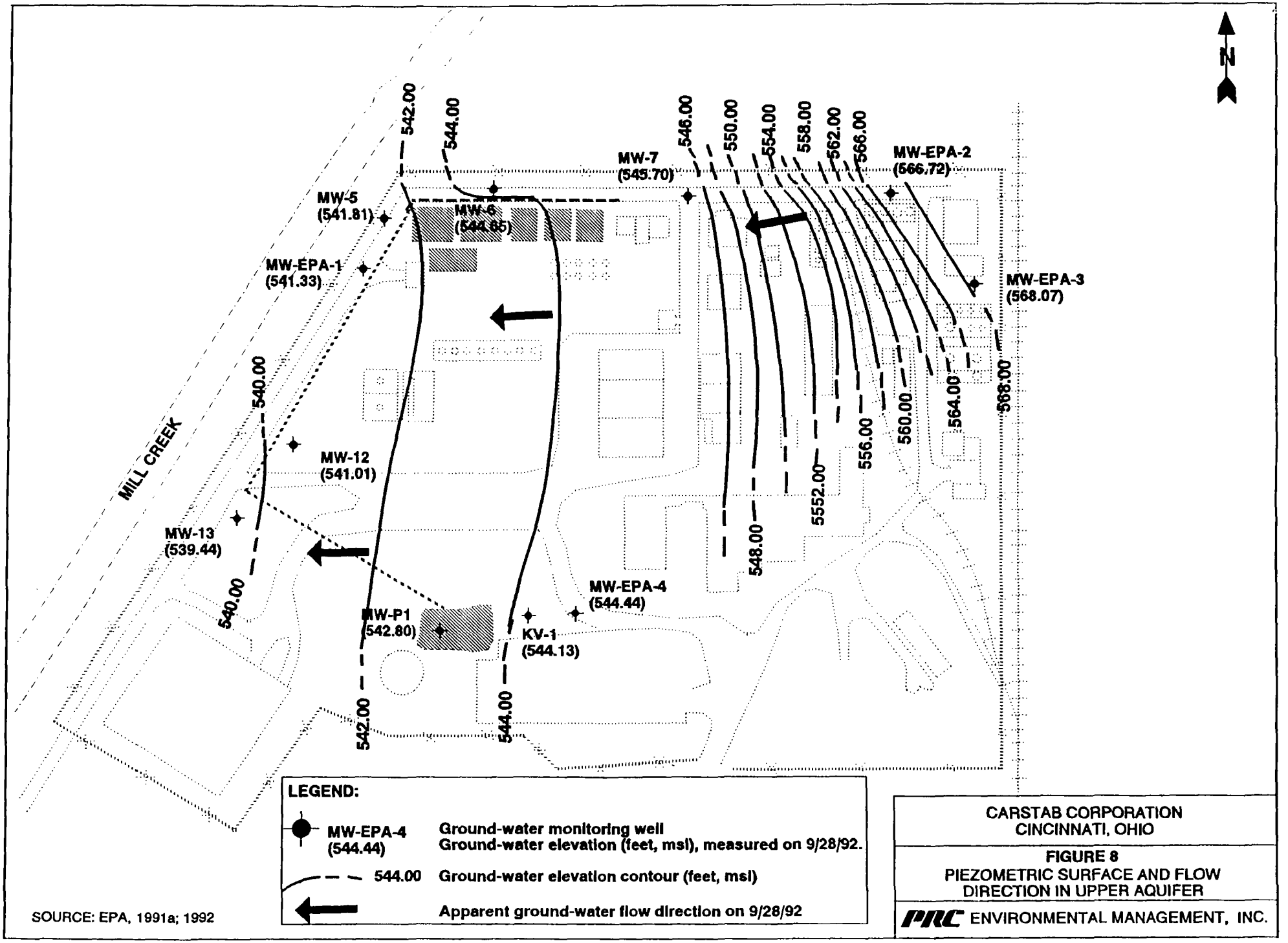
Geologic conditions were interpolated for areas between borings. Actual conditions may vary from those depicted on this figure.

SOURCE: EPA, 1987, 1991a, 1992; CRA, 1992.

CARSTAB CORPROATION
CINCINNATI, OHIO

FIGURE 7
GEOLOGIC CROSS SECTION A-A

PRC ENVIRONMENTAL MANAGEMENT, INC.



MW-EPA-1. This might have been caused by ground-water mounding along the slurry wall, compounded by infiltration of surface water from the nearby unlined Cincinnati Drum drainage ditch or by other unknown hydrogeologic effects.

The regional ground-water flow direction in the lower aquifer is reported to be from north to south (ODNR, 1959; EPA, 1987), down the Mill Creek Valley. However, flow direction in the site vicinity is heavily influenced by pumping in the Reading wellfields and is variable. After Reading Well No. 15 was installed in the north wellfield in 1987, northward flow in the deep aquifer (toward Well No. 15) was observed at Pristine (EPA, 1987). The radius of pumping influence of the Reading wellfields is unknown but, based on the observations at Pristine, is probably variable and dependent on which wells are in use and the amounts of withdrawal at any given time. Therefore, the Reading wells may be upgradient from Carstab at some times and downgradient at others.

A 4-mile radius map of the Carstab site area is provided in Appendix C. All residents within a 4-mile radius of the Carstab site are served by municipal water supplies. Of these municipalities Reading, Wyoming, Lockland, and Glendale obtain drinking water from the lower aquifer at locations within the 4-mile radius. Logs of several nearby wells (most of which are no longer in use) are included in Appendix D.

Reading's water supply, which serves about 12,000 people, is a blended system (PRC, 1992). Reading currently uses seven wells in the north wellfield (Reading Water Department, 1992a; 1992e). Four wells, including Well No. 15, which supplies about 67 percent of Reading's total water supply (Reading Water Department, 1992f), are located east of Mill Creek, adjacent to the northern boundaries of Pristine and Cincinnati Drum. Three wells are located west of Mill Creek, along the southeast boundary of GE. All of the wells in the north wellfield are within 0.25 mile of suspected source areas on the Carstab site. The south wellfield is located about 1,600 feet south of the site and contains only one well, Well No. 13, that is occasionally used during peak demand periods (Reading Water Department, 1992c).

Wyoming's wells are located about 1.2 miles southwest of the site, on the West Fork of Mill Creek, and supply water to about 9,900 people. Glendale's wells, which serve about 2,445 people, and Lockland's wells, which serve about 4,357, are located about 2.3 miles and 2.9 miles north of Carstab, respectively (OKI, 1991; PRC, 1992; Wyoming Water Department, 1992, Lockland Water Department, 1993).

Analytical data collected during the ESI do not indicate that TCL compounds (primarily 1,2-DCA) detected in Reading Wells No. 13 and 15 during the ESI are originating at Carstab. Therefore, the populations served by the Reading, Wyoming, Lockland, and Glendale wells are considered to be subject to potential, as apposed to actual, contamination from the Carstab site.

OEPA has requested that Reading close its wellfields due to the 1,2-DCA contamination. If this occurs the population using ground water within 4 miles of the Carstab site would be reduced to about 17,000 people, all of whom are served by wells that are more than 1 mile distant from the site.

4.2 SURFACE WATER PATHWAY

The potential for release of hazardous substances from the Carstab site to adjacent surface water bodies via overland flow or flood appears to be relatively low. No direct runoff pathway exists between the site and Mill Creek. On-site surface runoff in production areas flows into storm drains that discharge to Cincinnati MSD (EPA, 1992). The site is not located in the 100-year flood plain (U.S. Army Corps of Engineers, 1992). Also, the primary suspected source area (former surface impoundments) is paved over with asphalt and concrete, and the former swale is covered with soil and appears to be well vegetated. Therefore the potential for surface runoff to contact hazardous substances in these source areas is low.

There does appear to be a high likelihood for release of hazardous substances from the sources at Carstab to surface water in Mill Creek via discharge of contaminated ground water. As discussed in Section 4.1, the ground-water flow direction in the uppermost water-bearing zone is west-southwest. The zone discharges along the east bank of Mill Creek (see Figure 7). A ground-water sample from monitoring well MW-EPA-1, which is located approximately 100 feet east (upgradient) of the discharge boundary, contained significant concentrations of TCL compounds, including chlorobenzene. The results of soil and sediment sampling performed during the 1990 SSI and the 1992 ESI indicate that chlorobenzene is being released to Mill Creek from the leachate seep in the southwest corner of the Cincinnati Drum site. Since the ground-water flow direction is controlled by the configuration of the underlying clay layer, which dips slightly to the north in the northwest corner of the Carstab site (Salisbury/ATEC, 1983), the former Carstab surface impoundments may be contributing to this leachate discharge. However, the leachate seep extends about 200 feet north (upstream) along Cincinnati Drum's western boundary; therefore, it is likely that sources to the north of Carstab are also contributing to the leachate discharge.

Surface water bodies potentially affected by releases from the Carstab site include Mill Creek and the Ohio River, which Mill Creek enters about 12 miles downstream from the Carstab site. However, surface water usage in the area appears to be limited. Mill Creek and the Ohio River are not used for drinking water supplies or agricultural watering within the 15-mile downstream target distance limit (Kenton County Water Department, 1992; Cincinnati Water Department, 1992). It is not suspected that fish are taken from Mill Creek for human consumption (Hamilton County, 1992; Reading Police Department, 1992). The creek flows through heavy industrial areas and has been polluted by sewage discharge. Much of the downstream portion of Mill Creek has been diverted through a concrete channel and is very shallow. Therefore Mill Creek is not suitable for sustaining significant fish populations (EPA, 1992; Hamilton County, 1992). Fishing (for human consumption) does occur in the Ohio River. However, the average flow volume in the Ohio River is relatively high (in the approximate range of 10,000 to 100,000 cubic feet per second) resulting in a significant dilution factor (ORSANCO, 1990). No wetlands or other sensitive environments have been identified within 15 miles downstream from the Carstab site (USGS, 1961a; 1961b). Mill Creek does flow near several residential areas, however, and children occasionally play in and around the creek (EPA, 1991a).

4.3 SOIL EXPOSURE PATHWAY

Most of the Carstab site is paved; however, analytical data indicates that surficial soils in several small unpaved areas adjacent to tanks and buildings in the northeast part of the site are contaminated with TCL compounds and TAL analytes. The origin (attribution) of many of the contaminants is poorly defined, due to the presence of potential off-site sources.

The unpaved area around surficial soil sample location SS-7 is relatively small (less than 500 square feet) and does not appear to have ever been used by Carstab for production purposes. The area appears to receive surface runoff from the south end of the Pristine site, and many of the soil contaminants detected in this area were also detected at Pristine (EPA, 1987). Because of this, attribution of these contaminants (to Carstab) cannot be definitively determined based on information available at this time.

Soils in the grassy area around sample locations SS-1, SS-2, and SS-3 contain significant concentrations of TCL compounds and TAL analytes, that appear to be attributable to Carstab. The total size of this area is about 1,500 square feet. Because significant contamination was detected in only two of the three samples, which were evenly distributed throughout the grassy area, the exact area of contamination cannot be effectively determined at this time.

The Carstab site is completely fenced. Therefore, on-site workers are the only parties potentially exposed to the contaminated soils. About 175 Morton employees work at the facility (Morton, 1992b).

4.4 AIR PATHWAY

Air monitoring for VOCs was performed during all sampling activities at Carstab using a photoionization detector. No airborne VOCs were detected. No other air sampling was performed during the ESI. However, the potential for releases of airborne contaminants from the Carstab site appears to be relatively low (for source areas identified during the ESI). The primary suspected source areas (former impoundments and swale) are covered. Therefore, the only potential sources of airborne contaminants are the contaminated soils in the northeast part of the site (see Section 4.3). This area is relatively small and well vegetated, and therefore not likely to release significant quantities of hazardous substances to the air. The total population potentially affected by airborne releases from the Carstab site is estimated to be about 187,000 based on the averaged population densities of all municipal bodies located within a 4-mile radius of the site (USGS, 1961a, 1961b, 1961c, 1965a, 1965b; United States Department of Commerce, 1991).

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APPENDIX A

BORING LOGS

Depth (feet)	Sample Interval	Percent Recovery	SPT blows/foot	USCS Symbol	DESCRIPTION OF SUBSURFACE MATERIALS	MONITORING WELL CONSTRUCTION DETAILS
0					Asphalt pavement	Top-of-inner casing elevation = 553.10 feet msl; Concrete Pad
2	X	70	14		Brown silty fine to coarse sand and gravel; dry (FILL)	Flush-mount protective casing; 2-inch I.D. Stainless Steel Riser Pipe
4	X	100	6		Dark brown clayey SILT; slightly moist grades with fine sand	Cement/ bentonite grout; Bentonite Seal
6	X	67	7		Brown silty CLAY with trace fine to medium sand; moist	
8	X	67	24		Brown fine to coarse SAND with fine gravel; dry sand grades light brown and fine to medium with silt and no gravel	Coarse Silica Sand Filter Pack
10	X	67	50		grades with fine angular gravel sand grades fine to coarse	2-inch I.D., 0.010 Slot Stainless Steel Well Screen
12	X	63	30		sand grades wet; saturated with black staining with strong petrochemical odor	541.33 (Ground-water elevation on 9/28/92)
14	X	67	31			
16	X	100	32		Gray silty CLAY; moist; stained with black chemical to 14.5 feet	Bottom of well at 17 feet below ground surface
18					Boring completed at 17 feet and ground-water monitoring well installed on 9/16/92.	
20						
22						
24						

LEGEND:

X Split-spoon sample interval

SPT - Standard Penetration Test

Blows per foot - refers to the number of blows required to drive a 1.5-inch outer diameter split-spoon sampler a distance of 12 inches, using a 140-pound hammer falling 30".

USCS - Unified Soil Classification System

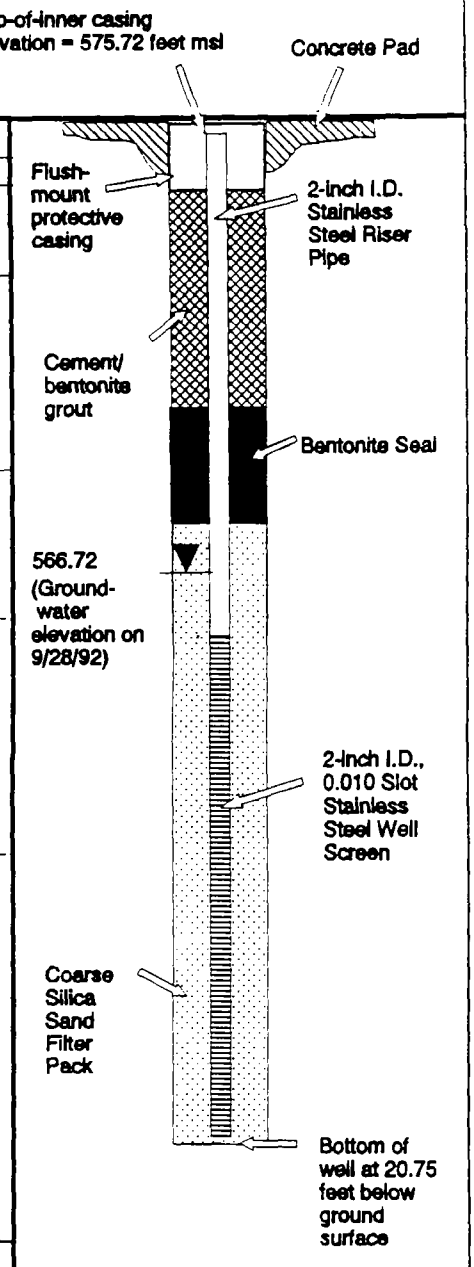
SOURCE: EPA, 1992

CARSTAB CORPORATION
CINCINNATI, OHIO

BORING LOG FOR
MONITORING WELL MW-EPA-1

PRC ENVIRONMENTAL MANAGEMENT, INC.

Depth (feet)	Sample Interval	Percent Recovery	SPT blows/foot	USCS Symbol	DESCRIPTION OF SUBSURFACE MATERIALS	MONITORING WELL CONSTRUCTION DETAILS
0					Asphalt pavement	
1					Brown silty fine to coarse sand and gravel; dry (FILL)	
2		58	13		Brown clayey SILT with fine to coarse sand; slightly moist	
4		67	8		Brown, clayey, fine to coarse SAND; slightly moist	
6		83	4		grades with less clay	
8		100	12		Light gray silty CLAY; trace fine gravel; 2-inch thick gray sand seam at 7.5 feet; moist	
10		100	16		Orange-brown SILT; trace clay; moist	
12		92	15		grades gray and clayey grades brown with fine sand; wet at 12 feet	
14		100	18		grades gray and clayey	
16		100	9		Gray silty CLAY; slightly moist; soft	
18		100	9			
20		100	7			
22		100	11			
24					Boring completed at 21.0 feet (sampled to 23.0 feet) and monitoring well installed on 9/14/92.	



LEGEND: ⊠ Split-spoon sample interval

SPT - Standard Penetration Test

Blows per foot - refers to the number of blows required to drive a 1.5-inch outer diameter split-spoon sampler a distance of 12 inches, using a 140-pound hammer falling 30".

USCS - Unified Soil Classification System

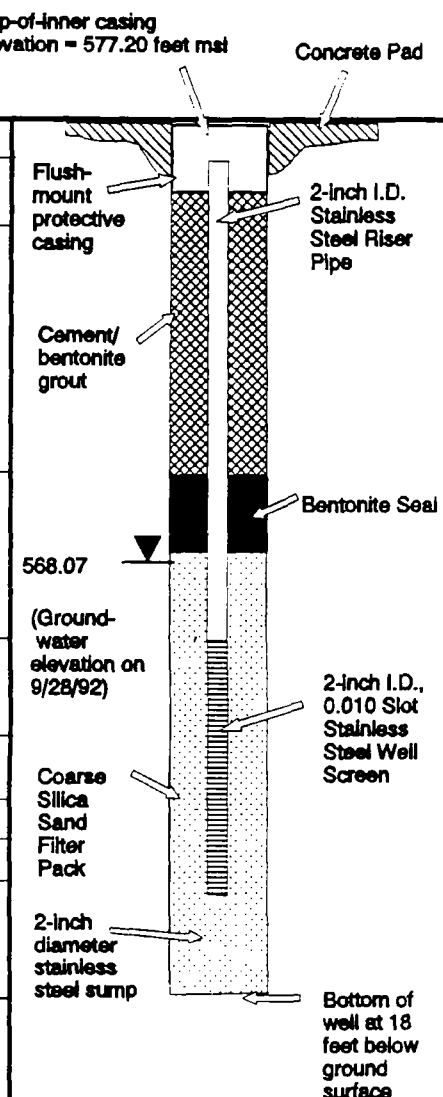
SOURCE: EPA, 1992

CARSTAB CORPORATION
CINCINNATI, OHIO

BORING LOG FOR
MONITORING WELL MW-EPA-2

PRC ENVIRONMENTAL MANAGEMENT, INC.

Depth (feet)	Sample Interval	Percent Recovery	SPT blows/foot	USCS Symbol	DESCRIPTION OF SUBSURFACE MATERIALS	MONITORING WELL CONSTRUCTION DETAILS
0					Brown, clayey topsoil	
2		33	10		Brown, clayey SILT with fine sand; moist; (FILL)	
4		79	9		Tan-brown and gray mottled clayey SILT; moist; trace orange-brown oxidation staining	
6		8	16		grades mostly tan with fine angular gravel	
					grades with clayey fine to coarse sand	
8		100	11		Brown, silty CLAY; slightly moist; trace fine gravel	
10		8	26			
12		100	30		Dark gray-brown, clayey SILT; slightly moist; trace fine to coarse sand and fine gravel	
14		100	30		Gray, silty CLAY; slightly moist	
					Gray, silty, fine to medium SAND; wet	
16		100	21		Gray, clayey SILT; slightly moist	
18		100	18		Gray, silty CLAY; slightly moist	
20					Boring completed at 18 feet and monitoring well installed on 9/16/92.	
22						
24						



LEGEND:

Split-spoon sample interval

SPT - Standard Penetration Test

Blows per foot - refers to the number of blows required to drive a 1.5-inch outer diameter split-spoon sampler a distance of 12 inches, using a 140-pound hammer falling 30".

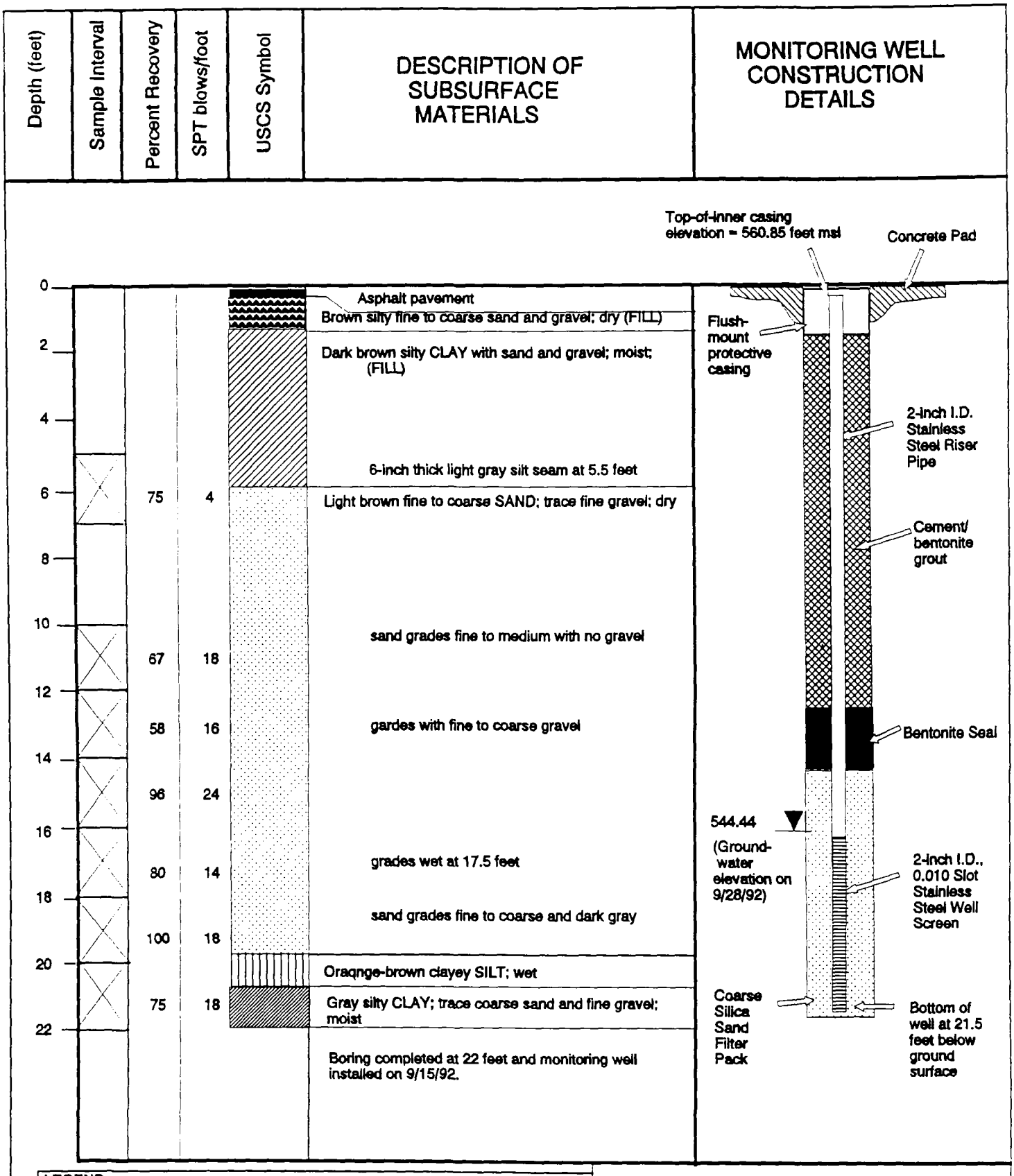
USCS - Unified Soil Classification System

SOURCE: EPA, 1992

CARSTAB CORPORATION
CINCINNATI, OHIO

BORING LOG FOR
MONITORING WELL MW-EPA-3

PRC ENVIRONMENTAL MANAGEMENT, INC.



LEGEND:

Split-spoon sample interval

SPT - Standard Penetration Test

Blows per foot - refers to the number of blows required to drive a 1.5-inch outer diameter split-spoon sampler a distance of 12 inches, using a 140-pound hammer falling 30".

USCS - Unified Soil Classification System

SOURCE: EPA, 1992

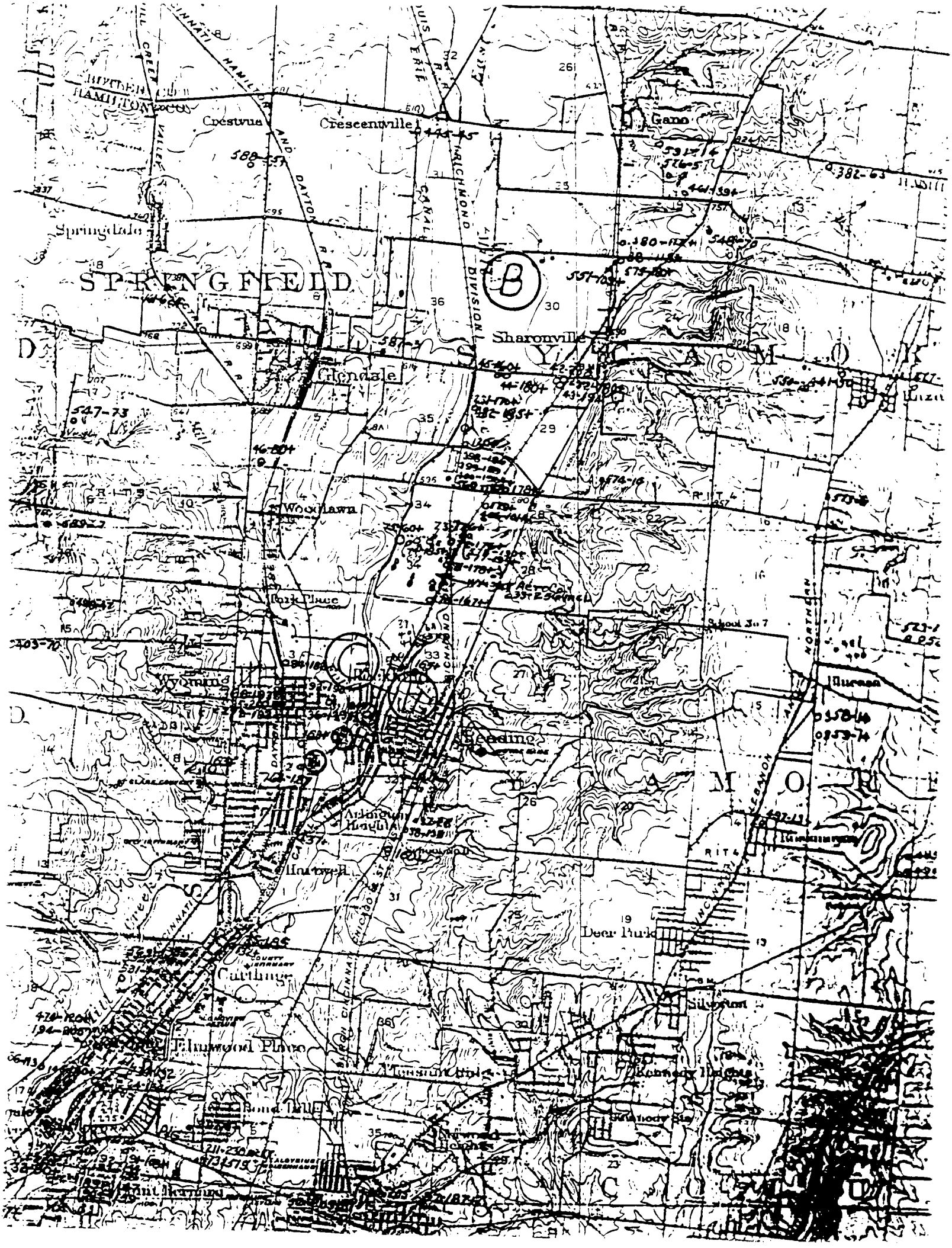
CARSTAB CORPORATION
CINCINNATI, OHIO

BORING LOG FOR
MONITORING WELL MW-EPA-4

PRC ENVIRONMENTAL MANAGEMENT, INC.

APPENDIX D

WELL LOGS IN THE SITE AREA


SPRINGFIELD
Springdale
Crestview
Crescentville
Gano
Sharonville
Glendale
Woodlawn
Park Place
Wyoming
Reading
Arlington Heights
Hunter Pl.
Deer Park
Cardinge
Elmwood Place
Bond Hill
Silverton
Kennedy Heights
Bureau
Hamilton
Dayton
Richmond
Division
Canal
Northern
Lebanon
Chicago
Cincinnati
Erie
Valley
Creek

OHIO WATER SUPPLY BOARD

#6

Well Record No. 70

31 —— 16

Co. Hamilton Twp. Sycamore Sec. 34

Well Location See map Size

Map E. Cinci.

Owner Wright Aero Co. Address

Driller Layne-Ohio Date 4/41

Well Head Elev. or M. P. 561

Elev. of Ground at Well

Pumping Test: 1000 GPM

Static Level 50' Date

Normal Pumpage

Quality Use

Adequacy of supply

Owner's Well No. or Other Designation Well #1

Source of Data Layne-Ohio

Collected by R. J. B. Date

STRATA	DEPTH From	DEPTH To
Clay	0	5
Coarse Gravel & Sand	5	20
Sandy Clay	20	21
Gravel & Sand	21	50
Blue Clay	50	61
Gravel & Boulders	61	68
Blue Clay	68	83
Gravel & Boulders	83	91
Blue Clay	91	96
Gravel & Sand	96	110
Fine Sand	110	145
Coarse Sand, Some Gravel	145	167

3

X 1,450,400
Y 457,900 S

See sketch on reverse side

* Chief Aquifer

OHIO WATER SUPPLY BOARD

Well Record No. 72

Co. Hamilton Twp. Sycamore Sec. 34
Well Location _____ Size _____
Map N. Cinci.

Owner Wright Corp. Co. Address _____
Driller Layne-Ohio Date 6/41

Well Head Elev. or M. P. Sea
Elev. of Ground at Well _____

Pumping Test: 1000 GPM

Static Level 46' Date _____
Normal Pumpage _____

Quality _____ Use _____

Adequacy of supply _____

Owner's Well No. or Other Designation Well #3

Source of Data Layne-Ohio
Collected by A.J.P. Date _____

STRATA	DEPTH From	DEPTH To
Clay	0	6
Fine Sand	6	28
Sand, Gravel, Boulders	28	30
Blue Clay	30	54
Fine Sand	54	100
Med. Sand	100	165
Coarse Sand, Some Gravel	165	178

3

x 1,451,560
y 46,415

* Chief Aquifer

R.A.F.

OHIO WATER SUPPLY BOARD

Well Record No. 71

Co. Hamilton Twp. Sycamore Sec. 34
Well Location _____ Size _____
Map N. Cinci.

Owner Wright Corp. Co. Address _____
Driller Layne-Ohio Date 6/41

Well Head Elev. or M. P. 561
Elev. of Ground at Well _____

Pumping Test: 1000 GPM

Static Level 55' Date _____
Normal Pumpage _____

Quality _____ Use _____

Adequacy of supply _____

Owner's Well No. or Other Designation Well #2

Source of Data Layne-Ohio
Collected by R.A.F. Date _____

STRATA	DEPTH From	DEPTH To
Clay	0	6
Sand & Gravel	6	32
Clay	32	39
Sand, Gravel & Boulders	39	52
Blue Clay	52	62
Sand	62	67
Blue Clay	67	79
Coarse Gravel	79	94
Fine Sand	94	150
Coarse Sand, Some Gravel	150	178

3

x 1,451,100
y 465,600

* Chief Aquifer

OHIO WATER SUPPLY BOARD

Well Record No. 231

31 — 16

Co. Hamilton Twp. Sycamore Sec. 35
Well Location Back Glendale Size 12"
water Works Map Mason
Owner The Drackett Co. Address Sharon Ave. Cincinnati, Glendale
Driller Layne-Ohio Date 10-7-33

Well Head Elev. or M. P.
Elev. of Ground at Well

Pumping Test: 1000 gpm

Static Level 25' Date
Normal Pumpage

Quality Use Industry

Adequacy of supply

Owner's Well No. or Other Designation 1
USGS 209
Source of Data Layne
Collected by Ramsey Date 8-19-42

STRATA	DEPTH From	DEPTH To
Soil & Clay	0	5
Fine Sand		20
Coarse Sand		29
Blue Clay		57
Fine Gray Sand		68
Blue Clay		77
*Fine Sand & Coarse Sand & Gravel		170

3

x 452,600
y 464,200

* Chief Aquifer

OHIO WATER SUPPLY BOARD

Well Record No. 73

31 — 16

Co. Hamilton Twp. Sycamore Sec. 34
Well Location Size
Map E. Cinci.

Owner Wright Aero Co. Address
Driller Layne-Ohio Date 1941

Well Head Elev. or M. P. 581
Elev. of Ground at Well

Pumping Test: 1000 GPM

Static Level 80' Date
Normal Pumpage

Quality Use

Adequacy of supply

Owner's Well No. or Other Designation Well #4

Source of Data Layne-Ohio
Collected by R.J.R. Date

STRATA	DEPTH From	DEPTH To
Top Soil & Clay	0	4
Sand	4	15
Coarse Sand & Gravel	15	22
Blue Clay	22	25
Gravel & Boulders	25	28
Blue Clay	28	40
Fine Sand	40	42
Blue Clay	42	44
Coarse Gravel	44	50
Sandy Clay	50	65
Gravel	65	68
Blue Clay	68	80
Fine Sand	80	155
Coarse Sand	155	176

3

x 450500
y 464,500

* Chief Aquifer

OHIO WATER SURVEY BOARD

Well Record No. 406

31 — 16

Co. Hamilton Twp. Sycamore Sec. 28
Well Location ____ Size 26" x 140'
18" x 50'
Map Mason

Owner Drackett Co. Address Sharonville, O.
Driller Owen Townsend Date 11/29/44

Well Head Elev. or M. P. ____
Elev. of Ground at Well ____

Pumping Test: 1200 GPM; 36'8" D.D.

Static Level 54'4" Date 11/29/44
Normal Pumpage ____

Quality ____ Use ____

Adequacy of supply ____

Owner's Well No. or Other Designation 2

Source of Data Layne-Ohio
Collected by ____ Date 8/21/46

STRATA	DEPTH From	DEPTH To
Top soil and clay	0	5
Sand, gravel & boulders		37
Blue clay		55
Gravel		58
Sandy clay		68
Boulders		70
Blue clay and gravel		81
Fine sand		95
Clay and boulders		116
Fine sand		170
Coarse sand and gravel		185
Pit: 140' of 26"		
50' of 18"		
Screen: 20' of 18"		

x 1,452600
y 466,400 S

* Chief Aquifer

OHIO WATER RESOURCES BOARD

Well Record No. 406

31 — 16

Co. Hamilton Twp. Sycamore Sec. 28
Well Location Evendale Rd. Sharonville Ohio Size 6" x 99'4"
Map Mason

Owner New York Central R. R. Address New York, New York
Driller Joseph Koehne & Sons Date 7/29/46

Well Head Elev. or M. P. ____
Elev. of Ground at Well ____

Pumping Test: ✓

Static Level 48' Date 7/29/46
Normal Pumpage ____

Quality ____ Use ____

Adequacy of supply ____

Owner's Well No. or Other Designation ____

Source of Data Miller
Collected by mt Date June 1948
Located by PMA

2501

STRATA	DEPTH From	DEPTH To
Gravel	0	33
Blue clay		44
Dirty gravel		47
Sand & clay (Soup)		67
Fine sand		76
Fine brown sand		82
Coarse sand		84
Sand		101
Type of screen: Cook red brass Tubular slot No. 20.		
Length of casing: 3'6"		
Length of screen: 4'2"		

x 1,452,900
y 466,100 S

* Chief Aquifer

OHIO WATER RESOURCES BOARD

Well Record No. 400

31 — 25

Co. Hamilton Twp. Springfield Sec.
Well Location Heuer Farm, 3 mi. N. Size
of Lockland Map Mason
Owner Fox Paper Co Address Lockland, Ohio
Driller Layne-Ohio Co Date 12/28/45

Well Head Elev. or M. P.
Elev. of Ground at Well
Pumping Test: ✓
Static Level ✓ Date
Normal Pumpage
Quality Use
Adequacy of supply
Owner's Well No. or Other Designation T.W. #3
Source of Data Layne
Collected by EJB Date May 1948

STRATA	DEPTH From	DEPTH To
Top soil	0	3
Clay, some boulders		90
Sand, some gravels		140
Sandy clay		192

3

x 1,451,500
y 41 40005

* Chief Aquifer

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Office No. 560
Log form No. 94101
Quad. Hamilton

Co. Hamilton 31 Twp. Sycamore 16 Sec. 36

Owner Pollak Steel Co.
Address Temple Bar Bldg., Cincinnati, O.
Well location Rt. 50-by pass, 2 mi. W. of Evendale

Construction Details	Pumping Test
Casing: Diam. 8" length 173'	Rate: 350gpm
Screen:	Hrs.: 8
Type of pump:	D.D. 10
Capacity:	S.L. 50
Depth of setting:	Date 11-27-51

Owner's Well No.
Driller Acme Well Drilling Co., Inc.
Located by JJS Date

Remarks

STRATA	Depth From	Depth To
Elevation		
Top soil	0	6
Muddy sand		16
Clay & boulders		72
Fine silty sand		142
Fine gray sand		160
Sharp sand & gravel bearing water		188

3

x 1,451,400
y 46 32005

*Approximate Location

DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No 142795

County Hamilton Township Reading Section of Township or Lot Number

Owner City of Reading Address Reading, Ohio

Location of property Reading Well Field

CONSTRUCTION DETAILS

Casing diameter 12" Length of casing 144' 10"
Type of screen Cook Length of screen 20' 6"OA
Type of pump Cook
Capacity of pump 350 GPM
Depth of pump setting 155'

NO PUMPING TEST

Pumping rate ____ G.P.M. Duration of test ____ hrs.
Drawdown ____ ft. Date ____
Developed capacity 350 GPM
Static level—depth to water 96' grounddlevel ft.
Pump installed by Jos. Koehne Sons

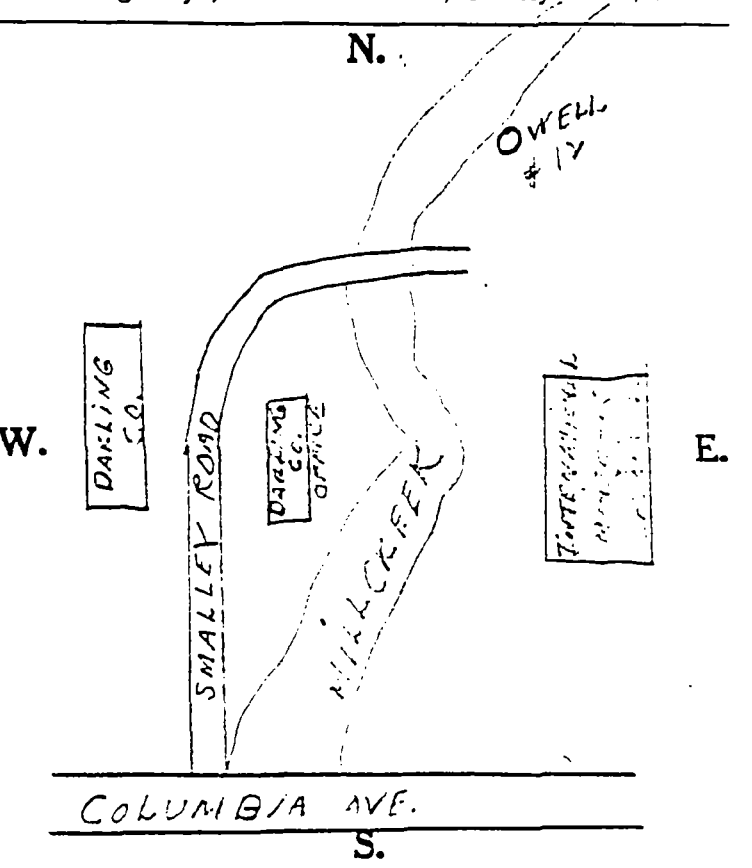
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Clay	0 Feet	14 Ft.
Blue Clay	14'	51'
Yellow Loom	51'	84'
Fine Brown Sand	84'	105'
Fine Gray Sand	105'	163'

Cook WW Red Brass Screen
slot size No. 16

SKETCH SHOWING LOCATION

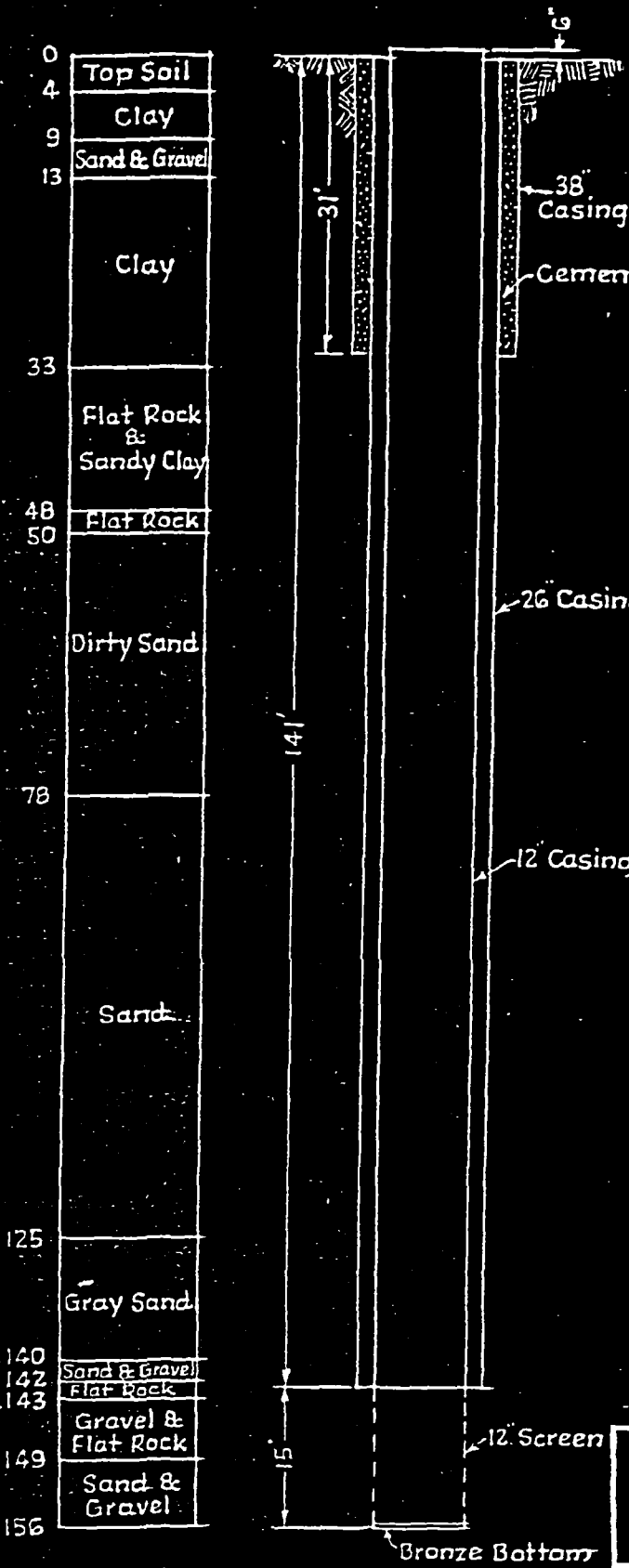
Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm JOS. KOEHNE SONS Date January 28, 1957

Address 1826 Sherman Ave., Norwood, Ohio Signed Jos. B. Koehne



MATERIAL:

Pit: 31' of 38"x3/8" Steel Casing, 141' of 26" Steel Pipe & 141'-6" of 12" Steel Pipe.

Screen: 14' of 12" Cook Screen with 1' of Blank Pipe on Top. .030 Openings.

Cone:

PUMP:

No.	38690	Shop No.	38690
Type	P.R.H.C.	Size	8"
Setting	140'	Stages	10
Suction	6"x 2'	Impellers	
Discharge	5"	Head	
Tubing	1½"	Press. B. P.	
Shafting	1"		

MOTOR:

Make	U. S.	Type	C. F. U.
Volts	440	Cycle	60
Phase	3	Amp.	31
H. P.	25	R. P. M.	1800
Frame	364-P	Serial	2700648

WELL:

Capacity		Static Level	100'
Guarantee	None	P. Level	120'-6"
Started	12-11-57	Pressure	
Finished	2-28-58	Pumped	300 G.P.M.
Accepted	2-28-58	Depth	156'

REMARKS:

115 Tons of Pea Gravel Used.

Driller: Reuben Sawyers

Installer: Neil Morris

THE LAYNE-OHIO CO.,

WATER SUPPLY CONTRACTORS

COLUMBUS OHIO

INTERNATIONAL MINERALS & CHEMICAL CORP.

LOCKLAND, OHIO

DRAWN BY O. L. M.E. APPROVED BY

WELL NO. 3 DRAWING NO. 1350

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio

PLEASE USE PENCIL OR TYPEWRITER. DO NOT USE INK.

No. 250803

County Hamilton Township Sycamore Section of Township

Owner American Cyanamid (Formica) Address 1015 Reading Road

Location of property West of US 25/42 Village of Evendale

CONSTRUCTION DETAILS

Casing diameter 12" ID Length of casing 127'
Type of screen Everdur Cork Length of screen 40'
Type of pump Vert Turbine - Wat Lube
Capacity of pump 600 GPM
Depth of pump setting 145'
Date of completion 4/5/60

BAILING OR PUMPING TEST

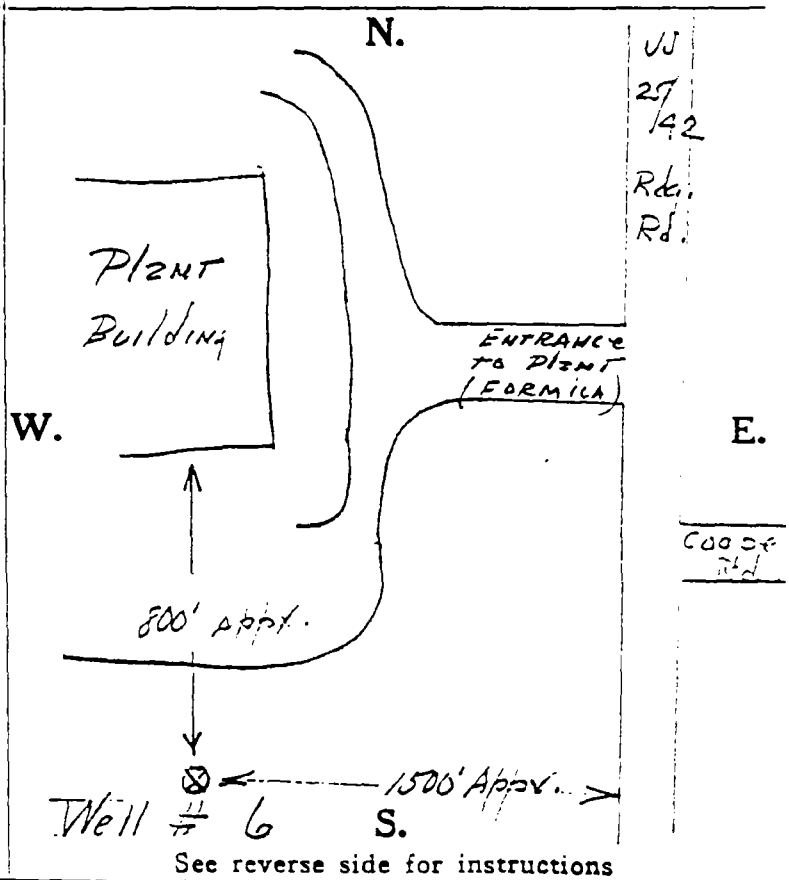
Pumping rate 860 G.P.M. Duration of test 8 hrs.
Drawdown 21' ft. Date 9/30/60
Developed capacity 600 GPM
Static level—depth to water 89' ft.
Pump installed by A. R. Posey Co., Inc.

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Top Soil + Clay	0 Feet	20.5 Ft.
Blue Clay	20.5	30.0
Med Brown Sand	30.0	33.0
Fine " "	33.0	56.0
Med " "	56.0	64.0
Coarse " " - +	64.0	70.0
Blue Clay.	70.0	96.0
Med. Grey Sand - - - +	96.0	102.0
" " "	102.0	126.0
" " "	126.0	141.0
" " "	141.0	153.0
" " " DARK	153.0	165.0
" " " - - +	165.0	168.0
Coarse Grey Sand - +	168.0	169.0
Lime Stone	169.0	174.0

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm A. R. Posey Co. Inc.
Address 246 Compton Rd. (10 Cincinnati 15 Ohio)

Date 4/9/60
Signed O. P. Brandt, Mgr.

PLEASE USE PENCIL OR TYPEWRITER. DO NOT USE INK.

DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio

No. 250804

County Hamilton Township Sycamore Section of Township

Owner American Cynamid (Formica) Address 10155 Reading Road

Location of property West of US 25/42 - Village of Evendale

CONSTRUCTION DETAILS

Casing diameter 12" Length of casing 141.05'

Type of screen Everdur (Cook) Length of screen 25'

Type of pump Vert. Turb. oil lube

Capacity of pump 600 G.P.M.

Depth of pump setting 155' (top of screen)

Date of completion (Her Fin) 4/19/60.

BAILING OR PUMPING TEST

Pumping rate 840 G.P.M. Duration of test 8 hrs.

Drawdown 30 ft. Date 4/2/60

Developed capacity 600 GPM.

Static level—depth to water 85' ft.

Pump installed by A.R. Posey Co.

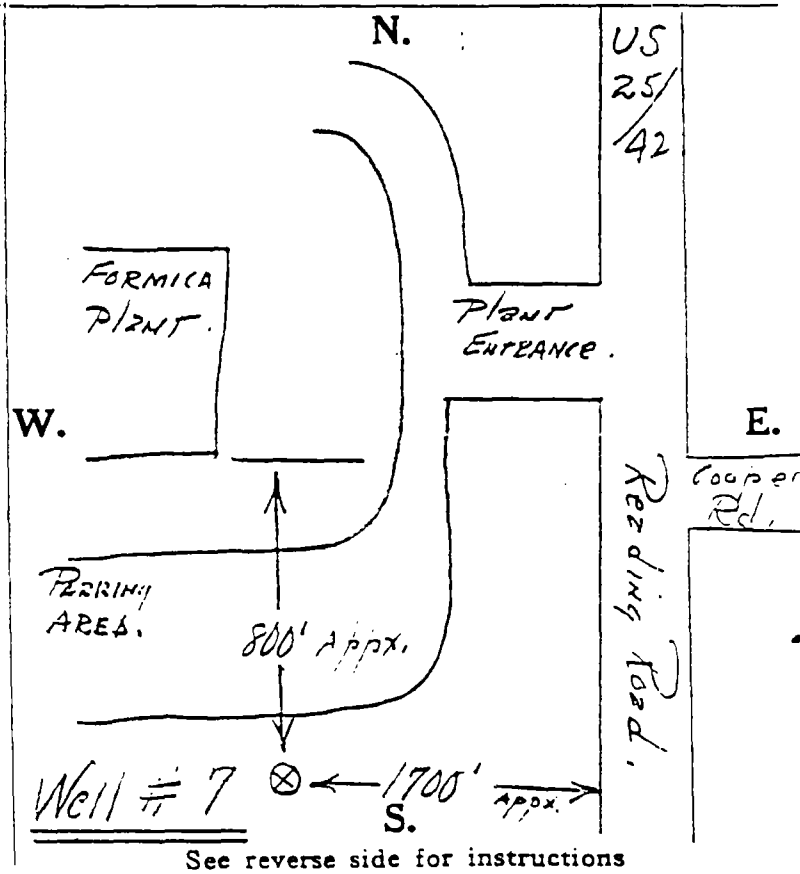
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Top Soil	0 Feet	2 Ft.
Brown Mud.	2.0	12.0
" " & Sand	12.0	23.0
Sharp Gravel	23.0	28.0
Blue Clay	28.0	34.0
Sharp Gravel	34.0	39.0
Fine Brown Sand	39.0	64.0
Med Brown Sand +	64.0	73.0
Brown Sandy Mud.	73.0	76.0
Med Sand & Gravel	76.0	81.0
" Gray Sandy Gr	81.0	93.0
Coarse Sand - - - -	93.0	98.0
Med Gray Sand	98.0	99.0
Coarse " - +	99.0	106.0
Med Gray Sand	106.0	118.0
" " "	118.0	143.0
" " " Dark	143.0	159.0
Coarse Sand & Gr.	159.0	163.0
Med " Dark	163.0	167.0
Coarse " + Gr.	167.0	171.0
" " "	171.0	176.0
Rock (lime stone)	173.0'	

- Large Size Rock
- Some Gravel

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm A.R. Posey Co.

Address 241 Erkenbrecher Ave. Cincinnati 32, Ohio

Date 4/17/60

Signed A.L. Posey
Manager.

31 — 16

Co. Hamilton Twp. Sycamore Sec. 33
Well Location Koenig Park Size
Map E. Cinci

Owner City of Reading Address
Driller A. E. Posey Date 1932

Well Head Elev. or M. P. 550'
Elev. of Ground at Well

Pumping Test: ✓

Static Level 62' Date 1932
Normal Pumpage —

Quality Use

Adequacy of supply

220-2
Owner's Well No. or Other Designation U.S.G.S. 220-2

Source of Data
Collected by R.J.B. Date

STRATA	DEPTH From	DEPTH To
Clay	0	4
Clay, Sand & Gravel	4	20
Blue Clay	20	31
Gravel & Sand	31	47
Blue Clay	47	60
Muddy Sand	60	65
Blue Clay	65	72
Coarse Gravel	72	81
Hard pan	81	94
Sand & Gravel	94	109
Hard pan	109	115
Sand & Gravel	115	152

Chemical analysis on file.

+ 1,449500
\ ... - ...
Y 4-35005

* Chief Aquifer

R.J.B.

OHIO WATER SUPPLY BOARD

Well Record No. 99

31 — 16

Co. Hamilton Twp. Sycamore Sec. 33
Well Location Koenig Park Size
Map E. Cinci

Owner City of Reading Address
Driller C. L. Beerly, Lafayette, Ohio Date 1934

Well Head Elev. or M. P. 551
Elev. of Ground at Well

Pumping Test: 350 GPM

Static Level 96.5' 8-6 Date 7/22/38
Normal Pumpage

Quality Use

Adequacy of supply

-1
Owner's Well No. or Other Designation U.S.G.S. 220-2

Source of Data
Collected by R.J.B. Date

STRATA	DEPTH From	DEPTH To
Yellow Clay	0	4
Muddy Sand	4	15
Blue Clay	15	30
Muddy Sand & Gravel	30	70
Blue Clay	70	75
Hard pan	75	99
Fine Sand	99	125
Coarse Sand	125	127
Yellow Clay	127	131
Sand & Gravel	131	151.5

X 1,449500
... - ...
Y 4-35005

* Chief Aquifer

OHIO WATER SUPPLY BOARD

Well Record No. 100

31 — 16

Co. Hamilton Twp. Sycamore Sec. 33
Well Location Walnut & Jefferson Ave. Size
Map E. Cinci

Owner City of Reading Address
Driller Jos. Koehne Date 1/31

Well Head Elev. or M. P. 555
Elev. of Ground at Well

Pumping Test: ✓

Static Level ✓ Date
Normal Pumpage

Quality Use

Adequacy of supply

Owner's Well No. or Other Designation U.S.G.S. 220-3

Source of Data Jos. Koehne
Collected by R.E.D. Date

STRATA	DEPTH From	DEPTH To
Dry Gravel	0	40
Clay	40	43
Coarse Gravel	43	55
Blue Clay	55	101
Fine Sand	101	110
Coarse Gravel	110	122
Fine Loamy Sand	122	133
Coarse Gravel	133	136
Fine Sand	136	152
Coarse Gravel	152	156
Bed Rock	156	

3

x 449,500
y 435,000

* Chief Aquifer

R.E.D.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1500 Dublin Road
Columbus, Ohio

No. 201948

County HAMILTON Township SYCAMORE Section of Township 24

Owner INT. MINERALS & CHEM CORP. Address CHICAGO ILL

Location of property LOCKLAND, OHIO -

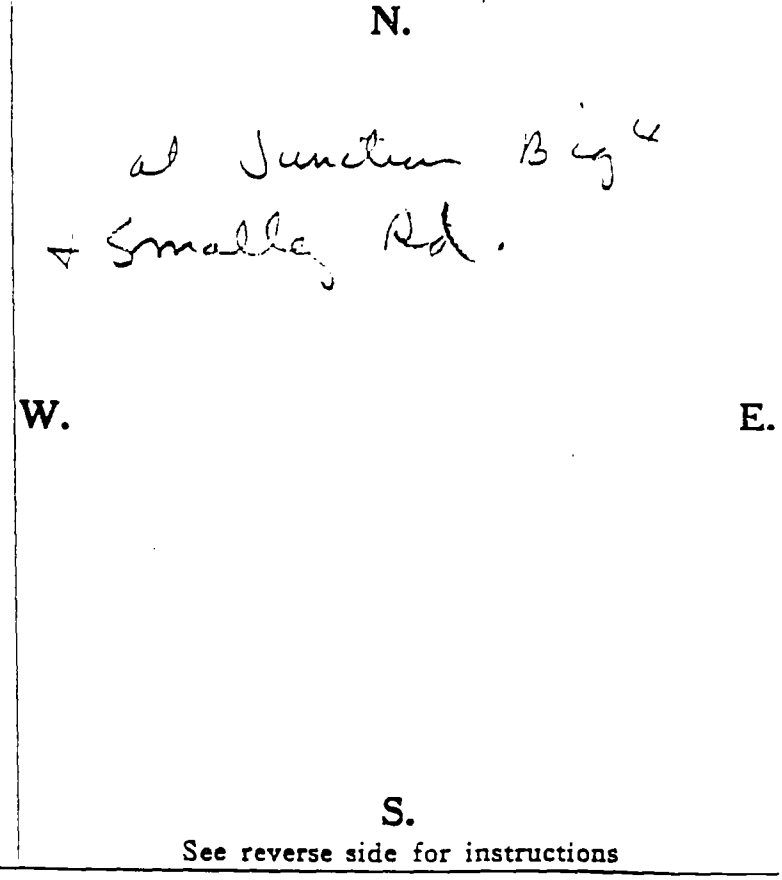
CONSTRUCTION DETAILS	BAILING OR PUMPING TEST
Casing diameter ..... Length of casing.....	Pumping rate.....G.P.M. Duration of test.....hrs.
Type of screen..... Length of screen.....	Drawdown.....ft. Date.....
Type of pump.....	Developed capacity.....
Capacity of pump.....	Static level—depth to water.....ft.
Depth of pump setting.....	Pump installed by.....
Date of completion.....	

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
#1-0	0 Feet	.....Ft.

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Layne Ohio Co. Date 3-28-58

Address C.C. O Signed I T Hunt

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No 142762

1449600
4495005

County Hamilton Township ~~Reading~~ Sycamore Section of Township or Lot Number south section.

Owner Reading Sand and Gravel, Inc. Address Granite Ave. Reading 15, Ohio

Location of property west end of Granite Ave, off Jefferson Ave.

CONSTRUCTION DETAILS

Casing diameter 8" Length of casing 127'
Type of screen COOK Length of screen 15'
Type of pump Turbine
Capacity of pump 100 GPM at 245' TDH
Depth of pump setting 139' OA

PUMPING TEST

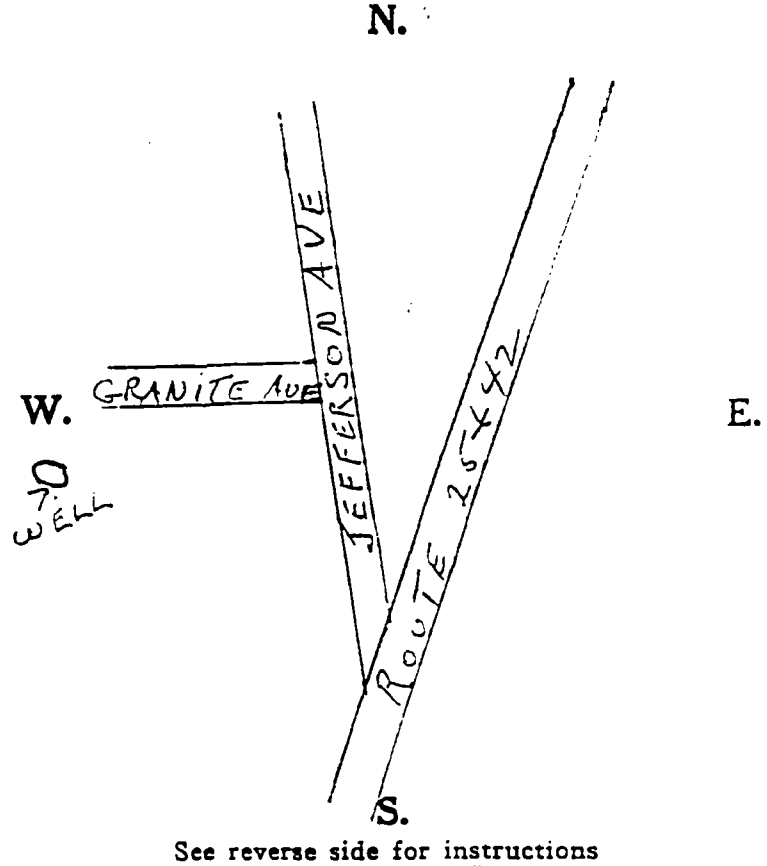
Pumping rate 100 G.P.M. Duration of test 2 hrs.
Drawdown - ft. Date
Developed capacity 200 GPM
Static level—depth to water 99 ft.
Pump installed by Jos. Koehne Sons.

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Yellow Clay & Gravel	0 Feet	~~21~~ Ft.
Yellow Clay	21'	36'
Dry Gravel	36'	46'
Sandy Blue Clay	46'	87'
Fine Muddy Sand	87'	101'
Brown Sand	101'	141'

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm JOS. KOEHNE SONS. Date October 18, 1954

Address 1326 Sherman Ave. ~~Norwood, 12, O.~~ Signed Jos B Koehne

State of Ohio
OHIO WATER RESOURCES BOARD
Department of Public Works
553 E. Broad St., Columbus 15, Ohio

No 51741

1,447,000 cc
200' x 500'
4 45,000 S

County Hamilton Township ~~Reading~~ Sycamore Section of Township or Lot Number

Owner City of Reading, Address Walnut St. Reading 15, Ohio

Location of property Reading Well Field-

CONSTRUCTION DETAILS

Casing diameter 12" Length of casing 152'7"
Type of screen Cook Length of screen 20
Type of pump Deming.
Capacity of pump 400 GPM
Depth of pump setting 140 ft. to pump bowl

PUMPING TEST

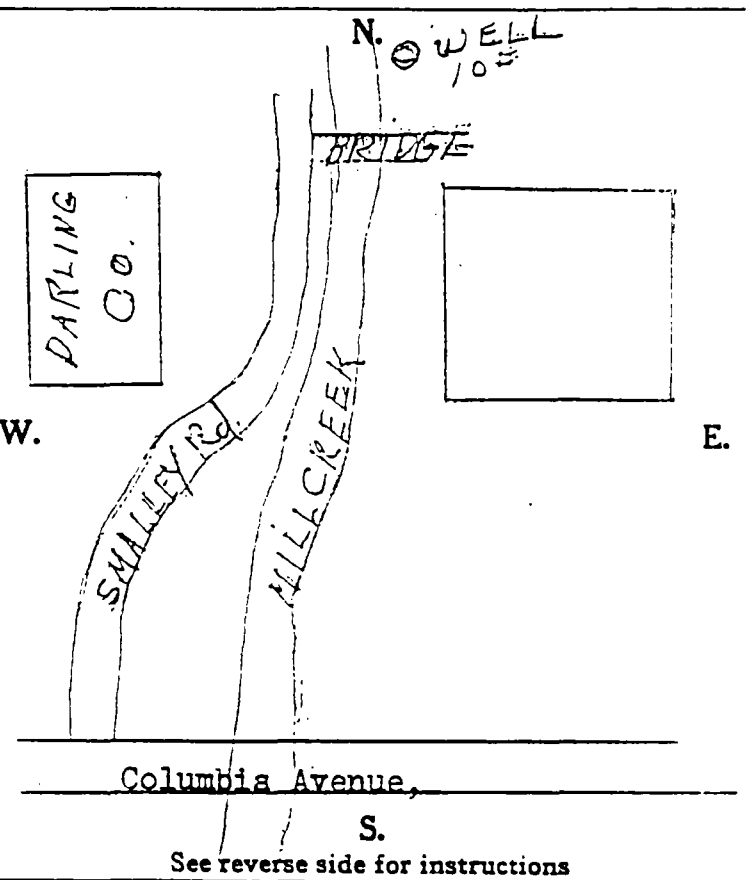
Pumping rate 400 G.P.M. Duration of test 4 hrs.
Drawdown 32 ft. Date
Developed capacity 400 GPM
Static level of completed well 99 ft.
Pump installed by Jos. Koehne Sons.

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Yellow S andy Clay	0 Feet	~~16~~ Ft.
Blue Clay	16	49
Muddy Sand	49	59
Sand and Some Gravel	59	104
Gray Sand	104	148
Gray Sand & Some Gravel	148	161
Gravel	161	172
Clay	172	

SKETCH SHOWING LOCATION

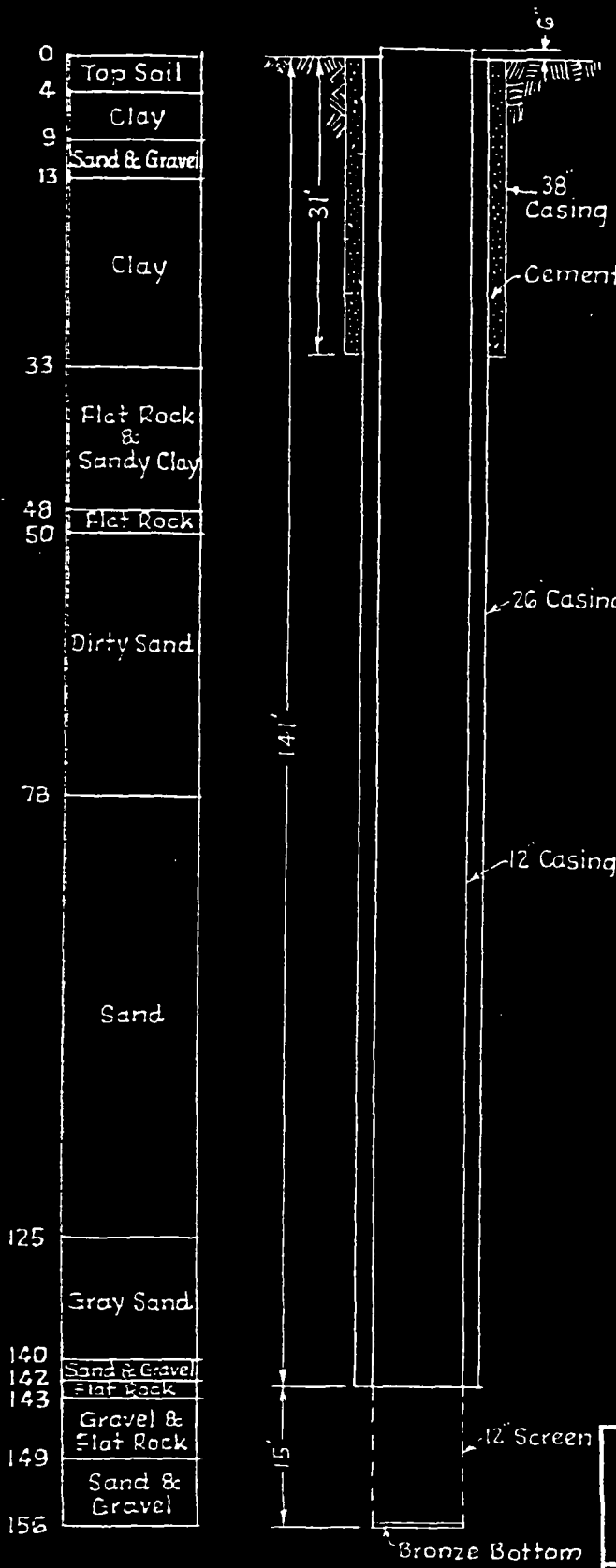
Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Jos. Koehne Sons. Date ~~July 12, 1954~~

Address 1826 Sherman Avenue, Norwood 12, Signed Clarence R Koehne



MATERIAL:

Pit: 31' of 38"x3/8" Steel Casing, 141' of 26" Steel Pipe & 141'-6" of 12" Steel Pipe.

Screen: 14' of 12" Cook Screen with 1' of Blank Pipe on Top. .030 Openings.

Cone:

PUMP:

No.	38690	Shop No.	38690
Type	P.R.H.C.	Size	8"
Setting	140'	Stages	10
Suction	6"x 2'	Impellers	
Discharge	5"	Head	
Tubing	1½"	Press. B. P.	
Shafting	1"		

MOTOR:

Make	U. S.	Type	C. F. U.
Volts	440	Cycle	60
Phase	3	Amp.	31
H. P.	25	R. P. M.	1800
Frame	364-P	Serial	2700648

WELL:

Capacity		Static Level	100'
Guarantee	None	P. Level	120'-6"
Started	12-11-57	Pressure	
Finished	2-28-58	Pumped	300 G.P.M.
Accepted	2-28-58	Depth	156'

REMARKS:

115 Tons of Pea Gravel Used.

Driller: Reuben Sawyers

Installer: Neil Morris

THE LAYNE-OHIO CO.,

WATER SUPPLY CONTRACTORS

COLUMBUS OHIO

INTERNATIONAL MINERALS & CHEMICAL CORP.

LOCKLAND, OHIO

DRAWN BY O. L. M.S APPROVED BY

WELL NO. 3 DRAWING NO. 1350

APPENDIX E

EPA POTENTIAL HAZARDOUS WASTE SITE INSPECTION FORM 2070-13

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington, DC 20460

EPA Form 2070-13
July, 1981

EPA Potential Hazardous Waste Site

Site Inspection Report

Site Inspection Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
Carbstab Corporation	2000 West Street				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG. DIST.**
Reading	OH	45215	Hamilton	061	2

09 COORDINATES LATITUDE	LONGITUDE	10 TYPE OF OWNERSHIP (Check one)
39° 14' 03 . 02"	84° 26' 19 . 3"	■ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER _____ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
03 / 09 / 92 (MONTH DAY YEAR)	■ ACTIVE ☐ INACTIVE	1950 (BEGINNING YEAR) 1993 (ENDING YEAR) ____ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ■ B. EPA CONTRACTOR PRC - EMI (Name of Firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (Name of Firm)

☐ E. STATE ☐ F. STATE CONTRACTOR _____ (Name of Firm) ☐ G. OTHER _____ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Guy D. Montfort	Geologist	PRC	(513) 241-0149
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO.**
Gabe Rood	Project Manager	PRC	(513) 241-0149
Greg Stacy	Environmental Scientist	PRC	(513) 241-0149
Christine Hirschman	Environmental Scientist	PRC	(513) 241-0149
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
Mr. Glenn Schaff	Health, Safety & Environment Manager	2000 West Street, Reading, Ohio	(513) 733-2100
Mr. Bruce Beiser	Plant Manager	2000 West Street, Reading, Ohio	(513) 733-2100
Mr. John Hanley	Senior Administrator Environment & Product Safety	2000 West Street, Reading, Ohio	(513) 733-2100
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
■ PERMISSION ☐ WARRANT	0900	Rain; 40°F

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Jeanne Griffin	U.S.E.P.A.	(312) 886-3007

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Guy Montfort		PRC Environmental Management, Inc.	(513) 241-0149	03 / 31 / 93 (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ■ A. GROUNDWATER CONTAMINATION — 02 ■ OBSERVED (DATE: 9/28/92) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 29,000 — 04 NARRATIVE DESCRIPTION

See Section 4.1 of ESI report.

01 ■ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE:) — ■ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION

See Section 4.2 of ESI report.

01 ■ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE:) — ■ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 187,000 — 04 NARRATIVE DESCRIPTION

See Section 4.2 of ESI report.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: N/A — 04 NARRATIVE DESCRIPTION

01 ■ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE:) — ■ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 12,300 — 04 NARRATIVE DESCRIPTION

See Section 4.3 of ESI report.

01 ■ F. CONTAMINATION OF SOIL — 02 ■ OBSERVED (DATE: 9/28/92) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: < 1 (Acres) — 04 NARRATIVE DESCRIPTION

See Section 4.3 of ESI report.

01 ■ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE:) — ■ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 29,000 — 04 NARRATIVE DESCRIPTION

See Section 4.1 of ESI report.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 176 — 04 NARRATIVE DESCRIPTION

See Section 4.3 of ESI report.

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) — ■ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 187,000 — 04 NARRATIVE DESCRIPTION

Total population within a 4-mile radius of site.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES *(Check all that apply)*

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ■ C. SLUDGE
- ☐ D. OTHER _____ *(Specify)*
- ☐ E. SLURRY
- ■ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

TONS: Unknown
CUBIC YARDS: Unknown
NO OF DRUMS: N/A

03 WASTE CHARACTERISTICS *(Check all that apply)*

- ■ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Unknown		See Section 2.2 of ESI report. Target Compound List (TCL)
OLW	OILY WASTE	Unknown		compounds and Target Analyte List (TAL) analytes were detected
SOL	SOLVENTS	Unknown		in soil, sediment, and ground water samples collected on site.
PSD	PESTICIDES	Unknown		
OCC	OTHER ORGANIC CHEMICALS	Unknown		
IOC	INORGANIC CHEMICALS	Unknown		
ACD	ACIDS	Unknown		
BAS	BASES	Unknown		
MES	HEAVY METALS	Unknown		

IV. HAZARDOUS SUBSTANCES *(See Appendix for most frequently cited CAS Numbers)*

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	See Section 3.3 of ESI report.				

V. FEEDSTOCKS *(See Appendix for CAS Numbers)*

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	See attached list.		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA FORM 2070-13(7-81)

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
■ C. AIR	Numerous air permits			
■ D. RCRA	Unknown	11/17/80		Withdrawn
■ E. RCRA INTERIM STATUS	Unknown	Unknown		No longer under interim status.
■ F. SPCC PLAN				
☐ G. STATE (Specify)				
■ H. LOCAL (Specify) MSD Permit	MIL-028	11/6/81	11/6/81	Sewer discharge; discontinued in 1992.
■ I. OTHER (Specify)	Unknown	Dec. 1992	Unknown	New sewer discharge permit.
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
■ A. SURFACE IMPOUNDMENT (6)	21,200	SQ. FT.
☐ B. PILES		
■ C. DRUMS, ABOVE GROUND		
■ D. TANK, ABOVE GROUND	≈ 73(#)	
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
■ I. OTHER alleged waste burial (Specify)	Unknown	

04 TREATMENT (Check all that apply)

- ☐ A. INCINERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ■ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ■ H. OTHER acid neutralization (Specify)

05 OTHER

■ A. BUILDINGS ON SITE
21

06 AREA OF SITE

34 (Acres)

07 COMMENTS

Identified sources are 6 backfilled surface impoundments used from 1955-1980. Wastes were also allegedly buried in a topographic depression in the south part of the site, prior to 1955.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ■ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Carstab site has runoff control. Tanks have dikes around them; transfer areas are constructed to prevent runoff. The hazardous waste storage pad is surrounded by a spill containment sump. Also, Carstab has a ground water collection system in place, to reduce discharge to Mill Creek; however ground-water contamination appears to have migrated outside of the collection system.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ■ NO

02 COMMENTS

Primary suspected sources are buried and covered. Site is fenced and has 24-hour security.

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See Section 6.0 of ESI report.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ■ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ■ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ■ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

Aquatic species in Mill Creek and the Ohio River could be affected by releases from site.

01 ■ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ■ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

See Section 4.2 of ESI report.

01 ■ M. UNSTABLE CONTAINMENT OF WASTES *(Spills/Runoff/Standing liquids, Leaking Drums)* — 02 ☐ OBSERVED (DATE: _____) ■ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 187,000 — 04 NARRATIVE DESCRIPTION

See Section 4.0 of ESI report

01 ■ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ■ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

See Section 4.2 and 4.3 of ESI report.

01 ■ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ■ OBSERVED (DATE: 1992) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

See Section 3.1 of ESI report.

01 ■ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ■ ALLEGED
04 NARRATIVE DESCRIPTION

Wastes were allegedly buried in the southern part of the site.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIAL AFFECTED: 187,000

IV. COMMENTS

The site is currently active; however, the two primary suspected source areas are inactive. Source #1 is a series of 6 former surface impoundments, now backfilled. Source #2 is an area where wastes were allegedly buried in the 1950s.

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 6.0 of ESI report.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WASTE, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE *(Check one)*

☐ A. 10^{-6} - 10^{-8} cm/sec ■ B. 10^{-4} - 10^{-6} cm/sec ☐ C. 10^{-4} - 10^{-3} cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK *(Check one)*

■ A. IMPERMEABLE *(Less than 10^{-6} cm/sec)* ☐ B. RELATIVELY IMPERMEABLE *(10^{-4} - 10^{-6} cm/sec)* ☐ C. RELATIVELY PERMEABLE *(10^{-2} - 10^{-4} cm/sec)* ☐ D. VERY PERMEABLE *(Greater than 10^{-2} cm/sec)*

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
≈ 180 (ft)	(at least 7) (ft)	unknown	

06 NET PRECIPITATION	07 ONE YEAR 24-HOUR RAINFALL	08 SLOPE		
		SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
40 (in)	2.5 (in)	≈ 2 %	West	2 %

09 FLOOD POTENTIAL	10
SITE IS IN 500 YEAR FLOODPLAIN	☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS *(5-acre minimum)*	12 DISTANCE TO CRITICAL HABITAT *(of endangered species)*
ESTUARINE OTHER N/A	> 15 (mi)
A. N/A (mi) B. > 15 (mi)	ENDANGERED SPECIES: N/A

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS, NATIONAL/STATE PARKS FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS PRIME AG LAND	AGRICULTURAL LANDS AG LAND
A. 0 (mi)	B. 0.1 (mi)	C. > 4 (mi)	D. > 4 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site is located on the east side of Mill Creek, and is near the eastern side of the Mill Creek valley. Local topography slopes upward to the east. The site is about 20-40 feet above the elevation of Mill Creek.

VII. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 5.0 of ESI report.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WASTE, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as appropriate)	SURFACE	WELL	02 STATUS (Due to other suspected sources) ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☐	B. ■	A. ☐	B. ■	C. ■	A. 0.1 (mi)
NON-COMMUNITY	C. ☐	D. ☐	D. ☐	E. ☐	F. ☐	B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING

■ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)

☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)

☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 29,000

03 DISTANCE TO NEAREST DRINKING WATER WELL 0.1 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
About 12-15 (ft)	Variable due to pumpage	50 (ft)	Unknown (gpd)	■ YES ☐ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

See Section 4.1 of ESI report.

10 RECHARGE AREA		11 DISCHARGE AREA	
■ YES ☐ NO	COMMENTS	■ YES ☐ NO	COMMENTS: Shallow ground water discharges to creek.

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

■ A. RESERVOIR, RECREATION DRINKING WATER SOURCE

☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES

☐ C. COMMERCIAL, INDUSTRIAL

☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Mill Creek	■	0 (mi)
Ohio River	☐	12 (mi)
		(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 12,000 NO. OF PERSONS	B. 47,000 NO. OF PERSONS	C. 105,000 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION: 0.15 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE	04 DISTANCE TO NEAREST OFF-SITE BUILDING
12,715	50 feet (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The site is in a mixed industrial, residential, and commercial area. Nearby residential areas are densely populated. Numerous other potential contaminant sources, including the Pristine NPL site, are nearby.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. CURRENT OWNER(S)

01 NAME	02 D + B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Morton International, Inc.		2000 West Street		Reading	OH	45215
N/A						
N/A						
N/A						

PARENT COMPANY (If applicable)

08 NAME	09 D + B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
Morton International, Inc.		Unknown		Chicago	IL	
N/A						
N/A						
N/A						

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D + B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Morton/Thiokol, Inc.		Unknown				
Carstab Corporation/Thiokol, Inc.		Unknown				
Cincinnati Milicron, Inc.		4701 Marburg Avenue		Cincinnati	OH	

IV. REALTY OWNER(S) (If applicable; list most recent first)

08 NAME	09 D + B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
N/A						
N/A						
N/A						

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See Section 5.0 of ESI report.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	12	RECRA Environmental Inc., Columbia, MD and	On File
SURFACE WATER	0	American Analytical & Technical Services, Broken Arrow, OK	
WASTE	0		
AIR	0		
RUNOFF	0		
SPILL	0		
SOIL	7	CompuChem, Inc., Research Triangle Pk., NC	On File
VEGETATION	0		
OTHER	(3) Sediment	RECRA Environmental Inc., Columbia, MD	On File

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
Hnu PID - (11.7)	No readings above background in breathing zone.
Explosimeter	No readings above background in breathing zone.
Oxygen meter	All readings normal.

IV. PHOTOGRAPHS AND MAPS

01 TYPE ■ GROUND ■ AERIAL

02 IN CUSTODY OF PRC Environmental Management, Inc.
(Name of organization or individual)

03 MAPS
■ YES
□ NO

04 LOCATION OF MAPS
PRC Environmental Management, Inc., Cincinnati, Ohio

V. OTHER FIELD DATA COLLECTED *(Provide narrative description)*

pH, conductivity, and temperature measurements were performed on ground water samples. (See tables 1, 2, and 5 in ESI report.) Also, ground water elevations were measured in all monitoring wells sampled (see Figure 8 in ESI report).

VI. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 5.0 in ESI report.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. ON-SITE GENERATOR

01 NAME	02 D + B NUMBER	
Carstab Corporation		
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		04 SIC CODE
2000 West Street		
05 CITY	06 STATE	07 ZIP CODE
Reading	OH	45215

III. OFF-SITE GENERATOR(S)

01 NAME	02 D + B NUMBER	01 NAME	02 D + B NUMBER
None known			
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE	03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D + B NUMBER	01 NAME	02 D + B NUMBER
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE	03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D + B NUMBER	01 NAME	02 D + B NUMBER
None known			
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE	03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D + B NUMBER	01 NAME	02 D + B NUMBER
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE	03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 5.0 of ESI report.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. CURRENT OPERATOR *(Provide if different from owner)*

01 NAME	02 D + B NUMBER
Morton International, Inc.	

03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
2000 West Street	

05 CITY	06 STATE	07 ZIP CODE
Reading	OH	45215

08 YEARS OF OPERATION	09 NAME OF OWNER
1989 - Present	Morton International, Inc.

OPERATOR'S PARENT COMPANY *(if applicable)*

10 NAME	11 D + B NUMBER
Morton International, Inc.	

12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	13 SIC CODE
Unknown	

14 CITY	15 STATE	16 ZIP CODE
Chicago	IL	

III. PREVIOUS OPERATOR(S) *(List most recent first; provide only if different from owner)*

01 NAME	02 D + B NUMBER
Carstab Corporation	

03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
2000 West Street	

05 CITY	06 STATE	07 ZIP CODE
Reading	OH	

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1982 - 1989	Morton-Thiokol, Inc.

PREVIOUS OPERATOR'S PARENT COMPANY *(if applicable)*

10 NAME	11 D + B NUMBER
Morton-Thiokol, Inc.	

12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	13 SIC CODE
None - no longer is existence	

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D + B NUMBER
Carstab Corporation	

03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
2000 West Street	

05 CITY	06 STATE	07 ZIP CODE
Reading	OH	

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1980 - 1982	Thiokol, Inc.

10 NAME	11 D + B NUMBER
Thiokol, Inc.	

12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	13 SIC CODE
Unknown	

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D + B NUMBER
Cincinnati Milacron, Inc.	

03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE
4701 Marburg Avenue	

05 CITY	06 STATE	07 ZIP CODE
Cincinnati	OH	45209

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1950 - 1980	Cincinnati Milacron

10 NAME	11 D + B NUMBER
Cincinnati Milacron	

12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	13 SIC CODE
4701 Marburg Avenue	

14 CITY	15 STATE	16 ZIP CODE
Cincinnati	OH	45209

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 5.0 of ESI report.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ■ 1. ACCESS TO SITE RESTRICTED — 02 DATE Unknown — 03 AGENCY None
04 DESCRIPTION
Site is currently completely fenced.

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 6.0 of ESI report.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
OH	OHD000724138

II. PAST RESPONSE ACTIVITIES

01 ■ A. WATER SUPPLY CLOSED — 02 DATE 1987 — 03 AGENCY Ohio EPA
04 DESCRIPTION
(Not due to Carstab site) See Section 2.3 of ESI report.

01 □ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
Unknown

01 □ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
Unknown

01 □ D. SPILLED MATERIAL REMOVED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ E. CONTAMINATED SOIL REMOVED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ F. WASTE REPACKAGED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ G. WASTE DISPOSED ELSEWHERE — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ■ H. ON SITE BURIAL — 02 DATE 1980 — 03 AGENCY ____
04 DESCRIPTION
Former surface impoundments were backfilled.

01 □ I. IN SITU CHEMICAL TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ K. IN SITU PHYSICAL TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ L. ENCAPSULATION — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ M. EMERGENCY WASTE TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ N. CUTOFF WALLS — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 □ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ■ P. CUTOFF TRENCHES/SUMP — 02 DATE 1984 — 03 AGENCY Ohio EPA
04 DESCRIPTION
Ground water collection system (french-drain) along western boundary.

01 ■ Q. SUBSURFACE CUTOFF WALL — 02 DATE 1984 — 03 AGENCY Ohio EPA
04 DESCRIPTION
Slurry wall along western part of northern site boundary.

EPA

POTENTAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
OH	OHD000724138

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION ■ YES □ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

Carstab performed a hydrogeologic investigation at the request of Ohio EPA in 1982-1983, due to preliminary studies by USEPA FIT that indicated contamination at the site. Carstab subsequently installed the ground water collection system to control discharge to Mill Creek.

OEPA performed a preliminary assessment at the site in 1986.

U.S.E.P.A./FIT performed a screening site inspection at Carstab in 1990.

U.S.E.P.A./TAT performed a site assessment at Carstab in 1991.

In 1992, Carstab was forced to pay a $40,000 fine for violating clean water act standards by discharging excessive quantities of toluene to Cincinnati MSD.

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See Section 6.0 of ESI report.

NPL Characteristics Data Collection Form

Instructions:

The NPL Characteristics Data Collection Form is designed to standardize hazardous waste site information for input into a database. The HRS package is the primary source of information for this form; however, if no hard data are available for a question, estimates based on professional judgment and other sources of information are acceptable. As you complete the form, please keep the following in mind:

1. Complete the form in dark pencil.
2. Use the most accurate level of information available (e.g., SI level information over PA).
3. If the designated response fields for a question are not adequate to accurately describe the site, use the "other" response with a brief explanation.

Record Information:

1. Site Reviewer: Guy D. Montfort
2. Date: 3/31/93
3. Site Name (as entered in CERCLIS): Carstab Corporation
4. Site Location (city/county, state): Reading/Hamilton/Ohio
5. Site CERCLIS Number: OHD000724138

NPL Characteristics Data Collection Form

Site Description (cont.)

9. Entity Responsible for Waste Generation (not the entity that generated the orginal product; check all that apply; check unknown only if no information is available.

- ■ Manufacturing (if checked, must check a subitem)
  - □ Lumber and Wood Products
  - □ Inorganic Chemicals
  - □ Plastic and Rubber Products
  - □ Paints, Varnishes
  - ■ Industrial Organic Chemicals
  - □ Agricultural Chemicals (pesticides, fertilizers)
  - ■ Miscellaneous Chemical Products (such as adhesives, explosives, ink)
  - □ Primary Metal Industries
  - □ Metal Coating, Engraving and Allied Services
  - □ Metal Forging and Stamping
  - □ Fabricated Structural Metal Products
  - □ Electronic Equipment
  - □ Other Manufacturing
- □ Recyclers
- □ Mining (if checked, must check a subitem)
  - □ Metals
  - □ Coal
  - □ Oil and Gas
  - □ Non-metallic Minerals
- □ Municipal Landfill (waste generator unknown)
- □ Military
- □ Department of Energy
- □ Federal Facility
- □ Unknown
- □ Other (fill in) _____

10. Site Activities/Waste Deposition (check all that apply; check unknown only if no information is available):

- ■ Surface Impoundment (primarily liquid)
- □ Waste Piles (primarily solid, covered or uncovered)
- □ Municipal Landfill
- □ Industrial Landfill
- ■ Drum/Container Storage (intentional storage in specified areas)
- ■ Illegal Dumping (unpermitted dumping by site owner/operator in undesignated disposal area)
- □ Unauthorized Dumping by Third Party
- □ Tanks - Above Ground (check if tank type unknown)
- □ Tanks - Below Ground
- ■ Discharge to Sewer/Surface Water (intentional permitted or illegal discharge; not secondary runoff)
- □ Recycling
- □ Airborne Release/Incineration (including incinerators, boilers, fire and burn pits, any fire incidents)
- □ Spill (accidental, 1 time only, not leaking drums or tanks)
- □ Unknown
- □ Other (fill in) _____

11. How Initially Identified (check 1):

- □ Citizen Complaint (including PA petition, anonymous)
- □ CERCLA Notification
- ■ State/Local Program
- □ RCRA Notification
- □ Other Federal Program
- □ Incidental
- □ Unknown
- □ Other (fill in) _____

12. Material Authorized to be Deposited Onsite By (check 1):

- □ Present Owner
- □ Former Owner
- ■ Present and Former Owner
- □ Unauthorized Dumping

13. Wastes Generated By (check 1):

- ■ Onsite Generator (include recyclers)
- □ Offsite Generator (include ground water plume, sediment contamination)
- □ Onsite and Offsite Generator
- □ Unknown

NPL Characteristics Data Collection Form

Site Name: Carstab Corporation
CERCLIS Number: OHD 00724138

Site Description

1. Coordinates (fill in or check unknown; if tenths of a second accuracy is not available, enter 0 as a default value in the appropriate space; as this information is necessary for interaction with other databases, check unknown only if no information is available).

39 ° 14 ' 03.2 " 84 ° 26 ' 19.3 " ☐ Unknown
N. Latitude W. Longitude

2. Setting (relative to local area's population density/distribution; check 1):

- ☐ Urban; central city areas
- ■ Suburban: bordering urban areas
- ☐ Rural, outside of suburban areas
- ☐ Unknown

3. Predominant Land Use Within 1 Mile of Site (check all applicable uses):

- ■ Industrial Area
- ■ Residential
- ☐ Forest/Fields
- ■ Commercial Area
- ☐ Agricultural
- ☐ Military
- ☐ Department of Energy
- ☐ Mining
- ■ Park
- ☐ Unknown
- ☐ Other (fill in) _____

4. Current Owner (or operator is no distinction is made; check 1):

- ■ Private - Industrial/Commercial
- ☐ Private - Individual (residential)
- ☐ Municipal
- ☐ County
- ☐ State
- ☐ Federal
- ☐ Indian Lands
- ☐ Ownership Not Applicable (ground water plume, sediment contamination)
- ☐ Multiple Owners/Different Categories
- ☐ Unknown
- ☐ Other (fill in) _____

5. Owner When Contaminated (or operator if no distinction is made; check 1):

- ■ Private - Industrial/Commercial
- ☐ Private - Individual (residential)
- ☐ Municipal
- ☐ County
- ☐ State
- ☐ Federal
- ☐ Indian Lands
- ☐ Ownership Not Applicable (ground water plume, sediment contamination)
- ☐ Multiple Owners/Different Categories
- ☐ Unknown
- ☐ Other (fill in) _____

6. Site Area (fill in area and check units or check unknown):

34 ■ Acres ☐ Square feet ☐ Unknown

7. Current Site Status (check 1):

- ■ Active: legal or illegal waste treatment, storage or disposal activities currently occur onsite.
- ☐ Inactive: no waste treatment, storage or disposal activities currently occur onsite.
- ☐ Site with Unknown Source (ground water contamination plume, sediment contamination).

8. Years of Operation (fill in or check unknown):

- ☐ Waste activity a one-time event (spill), record years of operation and note spill in comments section: (beginning year) _____ to (ending year) _____
- ■ Active site: (beginning year) 1950 to (date of site evaluation) 1993
- ☐ Inactive site: (beginning year) _____ to (ending year) _____
- ☐ Unknown (only if no historical information is available)

NPL Characteristics Data Collection Form

Water Use Information

22. Local Drinking Water Supply Source (check all that apply):

- ■ Ground Water (within 4 mile distance limit)
- □ No Water Withdrawals Within Target Distance Limits
- □ Surface Water (within 15 mile distance limit)
- □ Other (fill in) _____

23. Total Population Served by Local Drinking Water Supply Source(s) (fill in or check unknown or not applicable):

about 29,000 or □ Unknown □ Not Applicable

24. Drinking Water Supply System Type for Local Drinking Water Supply Source(s) (check all that apply):

- ■ Municipal (services over 25 people)
- □ Unknown
- □ Private
- □ Not Applicable

25. Distance to Nearest Drinking Water Well Within 4 Miles (fill in distance and check units or not applicable):

- □ Onsite Well
- ■ Offsite Well: 500 ■ Feet □ Miles □ Unknown □ Not Applicable

26. Depth to Uppermost Used Aquifer from Lowest Documented Point of Contamination (fill in or check 1):

about 50 (feet) □ Waste Directly Deposited Below the Water Level of Uppermost Used Aquifer ■ Unknown

27. Local Uses of Surface Water (check all that apply; check unknown only if no information available):

- ■ Recreation
- □ Commercial Fishery
- □ Industrial Process/Cooling
- □ None
- □ Unknown
- □ Other (fill in) _____

28. Surface Water Adjacent to/Draining Site (check all that apply; include all surface water bodies on the drainage pathway):

- ■ Stream ■ River □ Lake □ Pond □ Unknown
- □ Wetland □ Bay □ Ocean □ None □ Other (fill in) _____

29. Distance to Nearest Downstream Intake Within 15 Miles (for each category, fill in distance and check units, or check unknown, not applicable or none):

Distance to Drinking Water Intake: _____ □ Feet □ Miles □ Unknown ■ None □ Not Applicable (no surface water)

Distance to Intake for Other Use: _____ □ Feet □ Miles □ Unknown ■ None □ Not Applicable (no surface water)

Environmental Information

30. Is there a Sensitive Environment (as defined by the Sensitive Environments Rating Values Table of the rHRS) Within the Site's Target Distance Limit (4 mile radius for the air pathway, 15 stream miles for the surface water pathway):

□ Yes ■ No □ Unknown

NPL Characteristics Data Collection Form

Site Name: Carstab Corporation
CERCLIS Number: OHD 000724138

Site Description (cont.)

14. Waste Accessible to the Public (check 1):

□ Yes ■ No □ Unknown □ Other (fill in) _____

15. Miscellaneous Decriptive Information (check all that apply):

■ Consists of Multiple Units	□ Emergency Removal Has Occurred	□ Ground Water Plume
□ Units Owned by Multiple Entities	□ Other Removal Action Has Occurred	□ Sediment Contamination
□ Consent Order	□ Other Emergency Action Has Occurred	□ No Miscellaneous Descriptive Information Applies

Waste Description

16. Physical State of Wastes (check all that apply):

□ Solid ■ Liquid ■ Sludge □ Gas

17. Wastes Deposited or Detected Onsite (check all that apply):

■ Organic Chemicals	□ Radioactive Waste
■ Inorganic Chemicals	■ Oily Wastes
■ Solvents	□ POTW Sludge
□ Laboratory/Hospital Wastes	□ Municipal Wastes
□ Acids/Bases	□ Construction/Demolition Wastes
□ Paints/Pigments	□ Lead
□ Explosives	□ Asbestos
■ Pesticides/Herbicides	□ PCBs
■ Metals	□ Creosote
□ Fly and Bottom Ash	□ PCP
□ Mining Wastes	□ Dioxins
□ Smelting Wastes	□ Other (fill in) _____

Demographic Information

18. Workers Present Onsite (check 1):

■ Yes □ No □ Unknown

19. Distance to Nearest Non-Worker Individual (check 1):

□ Onsite	□ > 1/4 - 1/2 Mile	□ > 1 Mile
■ > 10 Feet - 1/4 Mile	□ > 1/2 - 1 Mile	□ Unknown

20. Residential Population Within 1 Mile (check yes and fill in number, or check no or unknown):

about 12,000 ■ Yes □ No □ Unknown

21. Residential Population Within 4 Miles (check yes and fill in number, or check no or unknown):

about 187,000 ■ Yes □ No □ Unknown